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In advance of the annual report of Mr. James M. Swank, secretary of the American Iron and Steel Association, on the production of the leading articles of iron and steel in the United States in 1881, we are enabled by his courtesy to present to readers the interesting facts it embodies. The amounts throughout are given in net tons. With the exception of iron rails, our production of every article enumerated was larger in 1881 than in 1880 or in any other year of our history:

Products.	1880.	1881.
Pig iron	4,295,414	4,641,564
All rolled iron, including nails and excluding rails,	1,838,906	2,155.346
Bessemer steel rails,	954,460	1,330,302
Open-hearth steel rails,	13,615	25,217
Iron and all other rails,	493,762	488,581
Kegs of cut nails and spikes, included in all rolled iron,	5,370,512	5,794,206
Crucible steel ingots.	72,424	89,762
Open-hearth steel ingots,	112,953	145,946
Bessemer steel ingots,	1,203,173	1,539,157
Blooms from ore and pig iron,	74,589	84,606

The value of our imports of iron and steel which in 1880 amounted to $80,443,362 only reached in 1881 $61,555,978. In the last eleven years, we have to go back to 1872 to get the nearest approach in value to the importation of 1880, that of the former year amounting to $75,617,677. The great falling off in importation commenced in 1874, the value gradually declining to 1878, when it was but $18,013,010. The quantities in tons of all the leading iron and steel products imported into the United States frrom all countries in the eleven years from 1871 to 1881, except in steel ingots, was as follows: 1871, 1,278,965; 1872, 1,325,034; 1873, 717,761; 1874, 337,845; 1875, 268,477; 1876, 228,716; 1877, 236,777; 1878, 236,434; 1879, 862,382; 1880, 2,112,341; 1881, 1,321,767. The occasion of the increased importation of the leading articles, with the exception of pig iron, were due to an insufficiency of home make to meet the demand which embraced pig, bar, boiler, band, hoop, scroll and sheet iron, iron and steel rails, castings, old and scrap iron, anchors, cables, and chains and tin plates; the large importation of pig iron in the last two years being due to the cheapness, notwithstanding the duty, of the foreign article.

The following table presents in net tons the imports and value of the leading articles in iron and steel imported in the first quarter of 1882:

Commodities Imported.	Net tons.	Values.
Pig iron,	99,333	$1,547,501
Castings,	306	19,169
Bar iron,	21,338	869,527
Boiler iron,	31	1,036
Band, hoop and scroll iron,	180	6,779
Railroad bars or rails, iron,	21,150	555,253
Railroad bars or rails, steel,	51,992	1,558,772
Sheet iron,	1,949	107,831
Old and scrap iron,	65,614	1,094,661
Anchors, cables and chains,	481	45,804
Tin plates,	56,262	4,410,446
Total,	319,636	$10,216,779

Nearly every iron producing country has contributed to our importations of iron ore. The total of such importation in 1879 was 284,141 tons of the value of $681,467; in 1880, it increased to 493,408 tons of the value of $14,266,800, and in 1881 to 782,877 tons of the value of $2,222,652.

The production of pig iron in this country in 1881 is thus set forth:

States.	Net tons.	States.	Net tons.
Pennsylvania	2,190,786	Connecticut	28,483
Ohio	701,546	Massachusetts	18,318
New York	359,519	Minnesota	7,442
Illinois	251,781	Indiana	7,300
Michigan	187,043	Colorado	6,396
New Jersey	171,672	Oregon	6,100
Missouri	109,799	California	4,414
Wisconsin	102,029	Maine	4,400
Alabama	98,081	Texas	3,000
Tennessee	87,406	Vermont	2,796
Virginia	88,711	Wash. Ter.	1,200
West Virginia	66,409	North Carolina	800
Maryland	48,756		
Kentucky	45,973	Total	4,641,564
Georgia	37,404		

The percentage of Ohio was 15⅛ in 1881, whereas in 1879 it was 14 3-5 and in 1880 15 5-7th. The increase in the production of pig iron in this country since 1879 has been 51 per cent. The percentage of the total production of 1881 in each of the territorial divisions was as follows in round numbers: Northeast, 13; Pennsylvania, 47; the South, 10; the West, 30; the Pacific coast, less than 1 per cent.

The production of spiegeleisen increased slightly in 1881 over previous years, the quantity produced in 1881 being 21,086 net tons. This country makes remarkably slow progress in the production of this essential raw material in the manufacture of Bessemer steel. Both foreign and domestic ores are used in its production in our furnaces. Ohio was one of the only three States that made spiegeleisen in 1881, the others being New Jersey and Pennsylvania. The spiegeleisen produced in this State was made by the Brier Hill Iron and Coal Company, of Youngstown, in a furnace specially built for that purpose and first blown in last year.

The quantity of bituminous coal used last year in the production of pig iron was 2,268,264 tons; of anthracite coal, 1,734,462 tons, and of charcoal 638,838 tons.

The consumption of pig iron in the United States in 1881 can be approximately ascertained. We produced 4,144,254 gross tons and imported 464,430 tons. We had in stock at the beginning of the year 407,730 tons of domestic pig iron and 164,404 tons of foreign pig iron. The total supply was 5,180,818 gross tons. At the close of the year we had on hand 188,300 gross tons of domestic pig iron and 9,953 tons of foreign pig iron, which, being deducted from the total supply, gives 4,982,565 gross tons as the probable consumption of the year.

The total rail production of 1881 was as follows, compared with the production of 1879 and 1880, net tons being used:

Kind of rails.	1879. Net tons.	1880. Net tons.	1881. Net tons
Iron rails	420,160	493,762	488,581
Bessemea steel rails	683,964	954,460	1,330,302
Open-hearth steel rails	9,149	13,615	25,217
Total	1,113,273	1,461,837	1,844,100

The increase in the production of Bessemer steel rails in 1881 over 1880 was 375,842 net tons, or 39⅜ per cent., and the increase in the production of open-hearth steel rails was 11,602 tons, or 85 per cent. In the production of iron rails in 1881 there was a decrease of 5,181 net tons upon the production of 1880, or about 1 per cent.

Mr. Swank rightly remarks that under the competition of steel rails, the production of iron rails must gradually decline. This decline has been going on since 1872. The approximate consumption of all kinds of rails in this country in 1881 was 2,230,422 tons, of which we imported 137,013 tons of iron and 249,309 tons of steel rails.

THE efficiency of the steam engine in the conversion of mechanical power into heat has, as yet, reached an unsatisfactory point, and efforts continue to be made to introduce other motors than steam. Ethers so quickly affected by change of temperature and as readily condensed, have proved practically illusive. Progress has been made in the application of hot air as a motor, but the advance has not been such as to lead to more than a very limited use of hot air engines. The dynamo-electric machine will undoubtedly be one of the great motors of the future. The gas engine is a promising motor in view of the improvements in methods of working that have been made of late years. Three distinct types of gas engines have been introduced. 1. An engine drawing into the cylinder gas and air at atmospheric pressure for a portion of its stroke, cutting off communication with the outer atmosphere, and immediately igniting the mixture, the piston being pushed forward by the pressure of the ignited gases during the remainder of its stroke; the in-stroke discharging the products of combustions. 2. An engine in which a mixture of gas and air is drawn into a pump, and is discharged by the return stroke into a reservoir in a state of compression. From the reservoir the mixture enters a cylinder, being ignited as it enters, and without rise in pressure, but simply increased in volume, and following the piston as it moves forward, the return stroke discharges the products of combustion. 3. An engine in which a mixture of gas and air is compressed or introduced under compression into a cylinder, or space at the end of a cylinder, and then ignited while the volume remains constant and the pressure rises. Under this pressure the piston moves forward, and the return stroke discharges the exhaust. The first and last are explosion-engines, the volume of the mixture remaining constant while the pressure increased. The intermediate one is a gradual combustion engine, in which the pressure is constant, but the volume increased. Calculating the power to be obtained from each of these methods, supposing no loss of heat to the cylinder, it is found that an engine of type 1, using 100 heat units, will convert 21 units into mechanical work; in type 2, 36 units; and in type 3, 45 units. The great advantage of compression is clearly seen by the simple operation of compressing before heating, the last engine giving for the same expenditure of heat 2·1 times as much work as the first. Compression makes it possible to obtain from heated air a great amount of work with but a small movement of piston, the smaller volume giving greater pressures, and thus rendering the power developed more mecanically available. Seeing the great difference produced between types 1 and 3 by the simple difference in the cycle operation when there is no loss of heat through the sides of the cylinder, the question arises which engine in actual practice, with the cylinder kept cold by water, will come nearest this theory? In which of the engines will there be the smaller loss of heat? Comparing the two engines, with equal movements of piston, it is found that the compression-engine has the advantage of a lower average temperature, and a greater amount of work done; also of less surface exposed to the flame, and consequently it loses heat to the cylinder. Taking all the circumstances into consideration, it is certainly not over-estimating the advantage of the compression-engine to say that it will, under practical conditions, give for a certain amount of heat, three times the work it is possi-

ble to get from an engine using no compression. The amount of gas consumed is as follows:

Type 1.	Lenoir,	95	cubic feet	per 1 HP	per hour.
"	Hugon,	85	" "	" "	"
2.	Brayton,	50	" "	" "	"
3.	Otto,	20	" "	" "	"

The Otto engine converts about 18 per cent of the heat used by it into work, while the Hugon engine only converts 3·9 per cent. Taking the loss of heat to the cylinder as given by the comparison of the adiabatic line of fall of temperature with the actual line of fall, as shown on the indicator diagram, it appears much less than was really the case, as shown by the gas consumed by the engine. The maximum produced is much less than would be expected from the amount of gas present; this is due to the limiting effect of chemical dissociation. In calculating the efficiency of the gas engine from its diagram, most observers have fallen into error, through neglecting the effects of dissociation, and, accordingly, their results are much too high. The cause of the comparative efficiency of the modern gas engines over the old Lenoir and Hugon type is to be summed up in one word—"compression." Without compression before ignition, an engine cannot be produced giving power economically and with small bulk. The mixture may be diluted, air may be introduced in front of gas or air, or an elaborate system of stratification may be adopted, but without compression no good effect will be produced.

We notice that a mechanical engineer of Worcester, Mass,, who has been for some time experimenting on a gas engine, has so far succeeded that he feels sanguine he has a formidable match for the steam engine. The new engine is smaller in proportion to its capacity. If steel is used for cylinders the inventor thinks an engine of 1,000 horse power can be built and run. Gas and air, it is claimed, compressed and exploded in an engine make a more powerful motor than steam. The new engine is double-acting, exploding twice in every revolution, instead of once, as do the earlier designs, thus greatly increasing its power. It is very simple in construction; all the valves are driven by eccentrics, thus reducing the friction and adding to the durability. The mixture of air and gas is compressed before admitting it to the cylinders, only sufficiently to fill the cylinders in the time required. Two of these engines are now being constructed. The inventor has also designed another gas engine on the disc engine principle, very simple in construction. It has six cylinders, and as the charge of each cylinder is exploded in succession once in every revolution of the engine, great uniformity in pressure, power and speed is attained. The gas engine is yet in its infancy and many long years of application to its improvement will be necessary before it can rank with the steam engine in capacity for all manner of uses.

A LONDON exchange, of high repute, devoted entirely to the interests of the iron manufacturers of Great Britain, who are dependent for the home prices they maintain on the demands of this country, takes occasion of the present strike to show in covert terms, its hatred of this country for maintaining protective duties. As a matter of course, it seizes on the weakest argument which has been suggested in favor of the present strike —and this not by the strikers themsrlves,—namely, the increased cost of living, on which it reads a homily to all protective countries on "artificial values." But this is not the point we refer to. The journal in question which for a quarter of a century has backed the ironmasters of England and Scotland whenever and wherever strikes has occurred, is all sympathy for the present strikers, and after dwelling tenderly on the amount of suffering which a prolonged struggle would entail on them, thus launches out: "Considering this, it is to be hoped that the difficulty will soon be ended, and that the masters will accede to the demannds of the men. In the great American Commonwealth it is professed that the interests of the working classes are a first consideration, and it becomes evident that the manufacturers must be accumulating great wealth out of the labor of their workmen or they could not treat with indifference the prospect of a six months' strike." What right has this journal to affirm that the iron-masters do treat the strike with indifference? American manufacturers are noted for their concern for their men. A signal instance is afforded by the Cleveland Rolling Mill Company in continuing their full complement of hands and piling up stock throughout a long period when the iron trade was depressed. Our contemporary, proud of the position it has taken, adds: "If the manufacturers cannot afford to accede to the demands of the men, they will perhaps state their case to the Tariff Commission, so that the duties on iron and steel may be increased so as to effectually shut out foreign iron. Then the American manufacturer being able to dictate his own terms to the unfortunate consumer, the workman would also come in for his share of the protectionist profits, and iron and steel would advance to a price which would effectually check eonsumption and retard the progress of industrial and agricultural enterprise in the United States. As matters stand at present, a prolonged strike in the United States will merely mean increased imports of British iron; and while this must have a beneficial influence on our own market, we regret it will be at the expense of the American iron workers." Let those who believe in crocodile tears give credit to our contemporary for its feelings, so deep that it cannot help expressing them. It continues: "To the manufacturers we offer no sympathy, because they desire none, though we doubt that the close of the strike will find their market in a healthier and more prosperous condition than it is at the opening. In this country the standing charges are so great, and the margin of profits so small, that our manufacturers leave no stone unturned in order to conciliate their men, and keep the works running, but it seems on the other side of the Atlantic, the manufacturers' profits are so large that a six months' strike is of no consequence, and by some makers is regarded as a good thing if the market happens to be in a weak state." Yet what is its very next sentence? "News has reached London that the Chicago ironworkers have inaugurated the strike in a diabolical manner, attacking a train in which a number of non-strikers were traveling, and a Judge of the Illinois Appelate Court has been fatally injured by a shot from a revolver." Yet the strikers are to have its sympathy, and the manufacturers none. The manufacturers can well do without it. The truth is that this journal, which represents an interest which hopes for the prolongation of this strike in order that it may lead to a vast importation of British iron into this country, has, in putting on the mask of hypocritical feeling for the men on strike for a movement which a majority condemn, but as to which they have been obedient servants of the Amalgamated Association, insults the common sense of its readers, who cannot fail to detect a chuckling tendency under its lachrymose vaporings.

Is there to be no future for steam tramways? In Paris at least the employment of motive power other than horse power has so far been a failure, although the experiments made have been most extensive, no fewer than twenty-one systems including those with compressed air, having been tried on the three local lines during the past five years. The Prefect of Police who has shown great indulgence to them, makes the continuous complaints made as to accidents arising from their use, the occasion for withdrawing the concession for steam engines, but it has been found that steam power is much more expensive than horse power. The steam tram requires the attendance of an engine-driver and a stoker, who draw larger wages than two coachmen. Fuel and maintenance of engines are also two very expensive items. Almost as much capital has to be sunk for tram engines as for horses. The only advantage derived from steam power in Paris is that the engine can haul two carriages each to fifty places; but there is no need for such heavy work excepting on Sundays and at certain hours of the day. Just on the broad avenues, where alone steam may be employed most advantageously, as interfering least with other traffic, there is a scarcity of passengers. Hardly a week, and seldom a day, passed without accidents happening, involving the companies in heavy expenses.

MANUFACTURES.

TO MACHINISTS, MANUFACTURERS AND OTHERS.

THE publishers of THE TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinist and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised befor sendin to press.

OHIO INDUSTRIES.

THE Novelty Works, Beaver Falls, are being enlarged.

THE Neshannock furnace has been supplied with three new boilers.

THE Youngstown Car Works are building "flats" for the Lake Erie Road.

THE rolling mill at Columbus is filling a contract for 6,000 tons of steel rails.

SIXTY-THREE Buckeye Binders were lately shipped to Buenos Ayres from the Akron works.

THE Stevens Filter Co., Toledo, has had an excellent trade the past season, the increase being about 30 per cent.

THE new rake and pick pactory of Heaton & Grayson, at Martin's Ferry, is about finished and ready for operations.

THE Union Mills, Canton, have been completely refitted by the late purchasers, Messrs. Corl & Rank, the refitting being done by J. Shook & Co., of that city.

MESSRS. J. R. Mills & Co., Cincinnati, are in receipt of orders from York, Pa., Holyoke, Mass., and Portland, Oregon, for the specialties of the Cincinnati Novelty Paper Co.

MESSRS. Smith, Myers & Schnier, Cincinnati, have just concluded a contract to build an extensive saw mill for Messrs. George R. Eager & Co., of Boston.—*Cincinnati Trade List.*

THE Lane & Bodley Co., Cincinnati, are very busy upon ordered work. They are just finishing one of their largest steam engines for the rope and cordage works of John Bonte's Sons.

ONE thousand three hundred reams of dark blue paper are being made at the Empire Mill, Cuyahoga Falls, to fill an order from New York. The paper will be used for lining sugar barrels.

THE Kent Carriage Works, Kent, are doing a fine business, and their shops are crowded with repairs. They now employ eight men, and will soon make further additions. They are crowded for room.

THE Lind Mill, South Canton, has been purchased by J. P. Roach & Co., and has been entirely remodeled by J. J. Shook & Son, of that city, who have also furnished all the machinery for the same.

THE Niles Tool Works, Hamilton, have just possessed themselves of a new steam elevator. It was built by N. M. Dennis, of No. 6 Home street, who makes none but first-class work, and whose trade, we are glad to know, is rapidly increasing.

THE Dayton Screw Works, which have been standing for several years, have been placed in complete running order by a newly organized company, who have added new and most approved machinery. The works have just gone into full operation.

DURING the month of May, the Railroad Speed Recorder Co., Kent, shipped 72 machines, and printed over 1,000 pounds of charts. They have ordered five tons of chart paper, which is expected to arrive soon. The machines at once become permanent fixtures wherever introduced.

THE Martin's Ferry Stove Co., with a capital of $10,000, with privilege of increasing the same to $100,000, have taken out a charter in West Virginia, and have let the contracts for their different buildings. The company are building a new factory to fully double their present capacity.

A MANUFACTORY has been put in operation in Cincinnati by Mr. Wm. French, for many years a leading mechanic for the National Watch Co., Elgin, Ill. His works are equipped with a very fine set of tools and machinery. He manufactures all kinds of patent articles, delicate instruments, watch machinery, dies, and special tools for fine work.

BUCHEL, GIBBS & Co., Canton, manufacturers of plows, have one of the largest establishments of the kind in the State. The main building is of brick, three stories, and covers an area of 46x120 feet. The foundry building is 70x100 feet; grinding room 28x60 feet, with a wing 20x29 feet; the blacksmith shop is 20x45 feet It is equipped with all the necessary machinery, tools and appliances in the various departments. Seventy-five hands are employed.

MESSRS. Houtzenroeder & Co., cigar manufacturers, Mansfield, started in business in 1870. They have a reputation of supplying excellent brands. This firm occupies a double building, 40x120 feet, and three stories. Sixty hands are given employment, all competent and careful workmen, fully equal to their work. From 8,000 to 10,000 cigars are manufactured per day, and are shipped to all parts of Ohio, Indiana, Michigan and Missouri.

CARTER & STEWARD, manufacturers of fine oatmeal, Akron, have carried on their business ten years. The building occupied by this firm is a substantial brick, 55x90 feet in size and four stories in height, and in the way of machinery is one of the most complete mills in the country. A 40-horse power engine is used, and 15 hands constantly employed. The capacity of the mill is 75 barrels of oatmeal per day, and its trade extends to every State in the Union.

HICKS, BROWN & Co., flouring mill, Mansfield, are the makers of well known brands. The product of their mill is 200 barrels daily. All the buildings are of brick: the first story affords storage room for 1,500 barrels of flour, while above, supported by massive iron pillars, are bins affording storage for about 50,000 bushels of wheat and 150 tons of bran. The mill is equipped with wheat cleaning machinery, purifiers, reels, bran dusters, flour packers and rolls. The motive power of the mill is supplied by a Harris Corliss engine of 150-horse power.

THE Oliver Chilled Plow Works (Ohio branch), Mansfield, manufactured last year 95,000 walking plows and 10,000 sulky plows, and anticipates making this year 20,000 sulky plows and 100,000 walking plows. The buildings occupied are strongly built, and especially adapted to the storage of these heavy goods. One building is 20x170 feet, and a basement of the same dimensions used for the storage of the heaviest parts of the plows. The other building is 40x80 feet. The house has won for itself a wide spread reputation.

THE Canton City Woolen Factory, Canton, L. Alexander proprietor, was founded by Messrs. Alexander & Feather as far back as 1857. In 1859 Mr. Feather retired from the firm, and Mr. Ralph Loft was admitted as a partner. He retired in 1860, since which time Mr, Alexander has been sole proprietor. He has built up and holds a trade gratifying to any business man. The goods cannot be excelled for texture and quality. The building is a 2½-story brick, 50x145 feet, and is fitted up with the latest improved machinery and a 30-horse power engine. Fifteen first class hands are employed.

THE Allen Flouring Mills, Akron, were established in 1857, by Messrs. J. & J. Allen & Co. They completed the putting in the entire new roller process of November of last year. The capacity of this mill is 300 barrels in twenty-four hours. Both water and steam power are used—one engine of 125 horse-power, with a total of 175 horse-power, in both water and steam. Steady employment is given to eighteen hands, and the trade of this house extends far in all directions. A branch house has been established in New York, and a large and flourishing trade has been built up in all the Eastern States.

THE buildings of the Union Foundry and Machine Works, Mansfield, carried on by Niman & Co., cover an area of 90x180 feet. The foundry and shops are fitted up with the latest improved machinery requisite for carrying on their business in all its various features and departments. A 10-horse power engine is used and employment is given to 14 skilled mechanics. They make a specialty of house fronts in the foundry, do a general jobbing business and manufacture skein setters which are considered the best machines of the kind in use.

THE works of Messrs. Patterson & Creigh, Mansfield, manufacturers of fine carriages, were established by Mr. A. C. Patterson in 1867 and in 1877 Mr. J. T. Creigh was a partner. The main building is 40x102 feet, with a wing 40x51, and another wing 28x30 feet. These buildings are three stories in height. The repository is two stories, 22x60 feet. Employment is given to twenty seven men; none but skilled labor is employed in these works, as they supply the trade with work that cannot be surpassed in finish and durability. They manufacture fine carriages, buggies, and buck boards in every style.

ONE of the important industries of Akron is that of the Akron Varnish Works, of which Messrs Kubler & Beck are proprietors. These works were established in 1878, and consist of two buildings, one 57x80 feet and the other 25x50 feet. They are supplied with the most approved styles of appliances for the speedy manufacture of their goods. The demand for the products of these works has been so great that the proprietors have doubled the capacity since 1880. At present the boiling capacity of the works is 140,000 gallons per annum, and tank capacity 40,000.

CRAWFORD & TAYLOR, wholesale cracker bakers, Mansfield, have carried on their business for eight years. The building occupied is 120x100 feet, three stories high. The entire establishment is fitted up in a most thorough and complete manner, and will compare favorably with any similar establishment in the United States. All the latest improved cracker and cake machinery known to the trade is used. Four reel ovens are used, three of which are 12 pan ovens and one 10 pan oven. This firm manufacture 600 barrels of crackers in ten hours, and have a capacity for manufacturing 1,200 in less than 24 hours. Besides the manufacture of crackers all kinds of cakes are made, and 150 barrels of flour are consumed every ten hours.

THE Mansfield Machine Works Co., Mansfield, commenced business with a capital of $50,000, which in 1867 was increased to $100,000, and in 1871 to $300,000. The main building is a three-story brick 40x360 feet, and the various buildings, including machine shop, foundry, wood-working department, paint shop and warerooms, occupy over four acres of ground. In the machine shop the mechanical equipments in every respect are as complete as capital can provide or ingenuity devise. They manufacture steam boilers, farm engines, portable and stationary engines, large power, double and single circular saw mills, pony circular saw mills with patent tooth saws, pulleys, shafting, gearing and mill machinery. The products of these works amount to over $500,000 per annum.

THE establishment of the Hill Liver Pipe Company, Akron, took place in 1873. This company occupy grounds to the extent of one acre, and their manufactory is 40x140 feet, three stories and basement in height. During the year 1880 they placed in their works $10,000 worth of new machinery, and had it equipped with all the latest improvements that can be found in the market. At present they are building an addition to their building and two new kilns, and will have a capacity by the first of March of three car loads per day. An eighty-horse power engine is used, and fifty hands are given steady employment. The trade of this house extends from the Mississippi river to the Atlantic coast. The officers of the company are D. E. Hill, president; J. Viall, superintendent; George R. Hill, secretary. Mr. D. E. Hill made the first piece of sewer pipe in the country, over forty years ago, and is the oldest pioneer in the trade.

THE Packham Crimper Co., Mechanicsburgh, manufacturers of specialties in tinners' tools, employ 25 hands and produce some 100 Packham's pipe crimping machines monthly. They have recently shipped 12 crimpers to London and have a good export demand. Besides their standard stove-pipe crimping machine, they have brought out and will offer to the trade this fall a pipe crimping tongs. The tongs are solely to supply the need of the machinist, while away from the shop, such as setting up stoves, as dealers must do. The sale in the United States for crimping machines is growing so rapidly that they find their facilities inadequate and will increase these.

THE Mansfield Brass Works, Mansfield, W. Barnett proprietor, were established four years ago, and the building occupied is 30x100 feet; but the rapidly increasing trade demands a much larger capacity, and he is now preparing to erect an additional building 30x60 feet and a wing to the original building 40x50 feet. The annual sales of this house reach $40,000, and employment is given to twenty-two hands. Brass castings of all kinds are made for steam engine builders and steam fitters, such as valves, cocks, tubing unions, hose nozzles, couplings, bands, nipples, injectors lubricators, oil cups, steam gauges, water gauges, steam whistles, in which he is building up an extensive trade; he also manufactures a balance valve that is claimed to be superior to any in the market, and is also making an improved lubricator. Mr. Barnett is a thorough mechanic.

THE works occupied by the Peerless Reaper Co., Canton, were established in 1870 by Messrs. C. Russell & Co., and were succeeded by the Peerless Co. in 1879, at which time it was organized as a stock company. The works cover an area of about four acres. The main building is four stories with basement, 50x225 feet; engine room, 40x50 feet; blacksmith shop, 40x100 feet; foundry, 60x120 feet; machine shop, 50x50 feet; warehouse, 40x250 feet. An engine of 80-horse power is used, and employment is given to 115 hands. Last season they turned out 2,500 reapers and mowers, and expect to make 3,500 machines this year. These machines are protected by patents purchased from Mr. K. W. Miller, and since the company was organized they have made a large number of improvements which they have patented. The officers of the company are Isaac Harter, President; W. A. Creech, Treasurer, and W. K. Miller, Superintendent, all gentlemen of fine business ability.

THE Diebold Safe and Lock Co., Canton, manufacturers of safes, vaults, and patent combination bank locks, was formed in 1876, taking up the business of Diebold, Norris & Co. The capital stock is $180,000. Employment is given to 370 skilled mechanics, and the trade of the house extends all over the United States. The products of this company are all covered with letters patent. This corporation have devoted themselves, with unusual talent and vigor, to the work of increasing their business resources and facilities, enlarging at a rapid ratio—keeping pace with all improvements suggested by inventive skill and experience. These works cover an area of more than two acres. The buildings occupied may be described as follows: The main building, which is in the form of an L, is is a two-story brick, with a frontage of 250 feet on Mulberry street, running back 400 feet, with an addition of 60 feet. The filling room is one story 40x100, the brass foundry is 25x35 feet, and a new two-story brick 50x100.

THE Roller and City Mills, Mansfield, Gilbert, Waugh & Co., proprietors, is one of the oldest houses in that section, having been established in 1865 by the Gilbert Brothers. The old mill is three stories in height and 40x60 feet. It has six run of stone and a capacity for turning out 100 barrels of flour per day. The well-known brands of this mill are "Gilbert's Best" and "Blue Diamond," and especial attention is given to custom grinding for

farmers. In 1870 Mr. J. M. Waugh was admitted to the firm, and the firm name was changed to Gilbert, Waugh & Co. This enterprising firm erected one of the finest mills in the State in 1881. It is built of brick, 42x72 feet, four stories and basement in height, with engine and boiler room, 30x40 feet. An engine of 125 horse power furnishes the motive power. It is fitted up with thirteen sets of rolls and two runs of stone, and has a capacity of turning out 200 barrels per day. The two mills combined have a capacity to manufacture 300 barrels per day. The special brands of the Roller Mill Hungarian Process are "Nonpareil," "Victor," and "Morning Glory." These are shipped to New York State, Pennsylvania and Ohio.

C. A. COLLINS & SON, manufacturers of carriages, Akron, are extremely busy at their works, where thirty-two men are employed. Mr. C. A. Collins commenced the manufacture of carriages when Akron was but a village. His small shops grew from year to year, and from decade to decade, until he has a very fine establishment—one of the largest and finest in the State. The buildings are on the corner of Main and Church streets. The factory buildings are 32x150 feet, three stories in height, and fitted up with an elevator for the purpose of taking the carriages to the different stories. By April 1st, there will be 150 vehicles of different kinds in this repository. This firm makes a specialty of the Cortland platform spring wagon.

THE Western Suspender Company, Mansfield, was established in 1857 by Mr. B. O. Foster, who in 1872 was succeeded by J. P. Rummel and J. R. Pollock, and in 1879 Mr. Pollock retired, since when Mr. J. P. Rummel has been sole proprietor. The building is a three story brick structure 40x50 feet, and was built by Mr. Rummel especially for the manufacture of his line of goods. He gives employment to forty experienced workmen. This business was first established in a private house, with one sewing machine, and has increased from year to year until it has reached its present goodly proportions. At present sixteen sewing machines are kept in operation. Suspenders, shoulder braces, garters, sleeve supporters, etc., are manufactured in great quantities and in all the latest styles. A specialty is made of the reversible suspender, which is so constructed as to be adjusted by slides instead of buckles. Mr. Rummel manufactures all his paper boxes in which the goods are shipped throughout the States of Ohio, Michigan, Indiana, Illinois, Iowa, Kansas, Missouri and Nebraska. The increase in business last year was much greater than any previous year.

FERDINAND SCHUMACHER, German mills, Empire barley mills and Cascade mills, Akron, gives employment to 115 hands. The flooring in the three different mills covers an area of three acres. The capacity of the mills is 220 barrels of flour, 250 barrels of oat meal and 125 barrels of pearl barley per day. All of the latest improved machinery is used, some of which has been invented by Mr. Schumacher for the speedy manufacture of his celebrated products. Every contrivance and appurtenance is used to make the most digestible and healthful human food, and a comparison of analysis of his oat meal shows it to be superior in many qualities. Mr. Schumacher's assortment of fine hygienic articles of food is the largest manufactured by any establishment in America. Three new box machines, manufactured by the Cleveland Box Machine Company, are employed, which have a capacity for producing 20,000 one and two pound paper boxes per day which are filled with his celebrated oatmeal, avena, farina, etc. A large amount of the meal is put up in ten and fourteen-pound air-tight tin cans in which it will keep perfectly sweet for years. Branch houses are established in Chicago and New York, and the trade of this house extends fron Maine to California.

THE Variety Iron Works Co., of Cleveland, Ohio, have lately added to their facilities by building a large annealing furnace, which will take in the largest heads and plates. All flanged work is heated in this shop to redness and straightened and annealed, removing all strains incident to flanging, which is especially desirable for steam boilers. This company lately furnished tubular boilers, many of them of Otis steel, to the following parties: Negaunee Concentrating Co., Negaunee, Mich., three 65 feet by 16 inches; T. M. Sinclair & Co., Cedar Rapids, Iowa, four 65 feet by 18 inches; Chicago Rubber Co., three 65 feet by 18 inches; Kentucky Wagon Co., Louisville, two 65 feet by 18 inches; John Finzer & Bros., Louisville, two 54 feet by 15 inches; one for Gebauer, Horton & Co., Helena, M. T.; two 56 feet by 18 inches for Gilbert Waugh & Co., Mansfield, Ohio; one 65 feet by 18 inches for Woods, Perry & Co., Cleveland; and many others. Their foundry, under the able management of Thomas D. West, is full of orders, and turning out excellent castings. Their machine shop is well supplied with the best of modern tools, since the destruction of their works by fire in 1879; among which are a pair of the Niles Tool Co.'s pulley machines, lathe and boring mill, turning out all sizes to 48 feet diam. pulleys, shafting and hangers being a specialty with this concern. About one hundred and sixty men are employed.

MASSACHUSETTS.

AT Springfield the manufacturers of the champion mowers now occupy their new shops, which are the largest of the kind in this country, and employ about 1,300 men. Are working nights to finish this season's work. They will turn out about 8,000 harvesters and self-binders, in addition to the usual number of reapers and mowers, and are behind orders notwithstanding their increased facilities.

A NEW rivet machine is in operation at the Plymouth Mills, Plymouth, which cuts 230 small rivets per minute. Heretofore 170 has been the limit.

THE Royal Sewing Machine Co. has been organized at Attleboro.

THE Carrol Machine Co. of Worcester is about shipping a double yarn-twister to Messrs. E. D. Sparks & Co., Chester, Pa.; also yarn-twisters to L. Alexander, Canton, O.

Worcester has seventeen machine tool building establishments in operation, and the eighteenth has patterns ready to go into the business in a few weeks. David W. Pond has the largest shop. He employs 240 workmen, and (like most of the other machine tool shops) has his castings made outside. He has orders booked for months ahead, on some sizes and styles of tools. The next largest shop is that of P. Blaisdell & Co., who employ 70 to 75 men on lathes and drill presses. A. M. Powell & Co., who started two years ago with two or three workmen, moved into a new three story brick shop the first of last March, and now have 50 men at work on lathes and planers. The Whitcomb Manufacturing Co., who make iron planers a specialty, have about 30 men at work. The Lathe & Morse Tool Co., have forty to fifty men at work in their new shop near the Junction. Prentice Bros. are having a rush of orders for their new upright drill, and are building a large number of them. F. E. Reed says he could sell three times as many of his new pattern lathes as his shop can turn out; orders for them are very often duplicated. H. C. Pease & Co., have recently started to build medium sized iron planers, which give good satisfaction. N. W. Bancroft & Son have patterns ready for a new iron planer, which will be placed on the market as soon as they can get suitable shop room to set them up. All the iron foundries in town keep enlarging, yet cannot fully supply orders for castings. McMahon & Carver have lately moved into their new brick shop. Wm. H. Eddy is building a new style of gap lathe which seems to be pleasing all those who use it. Fuller & Co., have fitted up their shop with new tools, and are building lathes as a specialty. Boynton & Plummer are having an increasing demand for their small shapers from all parts of the country.

CONNECTICUT.

THE A. Burritt Hardware Co., Waterbury, have bought a tract of land in that city, on which they intend to erect a factory for the manufacture of a patent fire-extinguisher.

THE Overman Wheel Co., Hartford, are putting on the market the "Victor" tricycle, invented by Mr. A. H. Overman. From all accounts it is a wonderful vehicle.

THE Pratt & Whitney Co., Hartford, are making seven large rivet-heading machines for parties in Germany. The machines are very powerful, upsetting cold Ulster iron half an inch round, and making countersunk heads of seven-eighths of an inch in diameter at the rate of 80 per minute.

VERMONT.

NEW machinery has recently been added at the button works, Burlington, which increases the production about 100 gross per day.

NEW HAMPSHIRE.

HOLT BROS., Concord, are largely interested in the manufacture of wheels, spokes and carriage woodwork. Their mills are in Ohio and Virginia, and they have a branch house in California. They do a large and constantly increasing local and New England business, and their establishment is one of the largest in this section. Though great as is its capacity, it is taxed to the utmost to meet the accumulating orders.—*Boston Manufacturers' Gazette.*

NEW YORK.

AN extensive shop for the manufacture of a new nut-tapping machine is about to be erected in Fredonia by Howard Bros.

EXTENSIVE paper works are being erected at Mechanicsville by the Hudson River Power Paper Co.

PENNSYLVANIA.

THE Keystone Steam Pump Works of Thompson, Epping & Carpenter, Pittsburgh, are building pumping machinery for the Standard Iron Co. and the Ætna Iron and Nail Co., Bridgeport, O., the Jefferson Iron Works, Steubenville, O., and the Newburg Furnace Co., Cleveland.

R. H. SMITH, of Pittsburgh, has closed a contract with a company in Latrobe, Westmoreland county, for the erection of a gas works, at a cost of $20,000, which is to include two miles of pipe.

THE Pardee Car and Machine Works, Watsontown, are now engaged in building a derrick car for the New York, West Shore & Buffalo Railroad Co. that is said to be the largest of the kind ever constructed. It is made entirely of iron and steel, and is rigged so it can be operated either by hand or steam power, and is capable of hoisting the heaviest cars now in use.

THE Disston Saw Works, Philadelphia, is the largest establishment of the kind in the United States. They consumed last year 21,000 tons of coal; 10,000,000 feet of lumber; worked into edged tools 80 tons of steel per week. For files alone they used 450 tons of bar steel. The output of manufactured goods was as follows: 3,800 large and 39,000 small circular saws; 1,250,000 long saws; 201,500 dozen files, and a large quantity of miscellaneous tools. They employ over 1,400 hands in their works. Their pay roll is about $18,000 per week.

JOHN ROACH is employing over 2,000 men in his shipyards and foundry. The vessels now under way aggregate over 25,000 tons. Since 1870 Mr. Roach has turned out over $25,000,000 worth of vessels.

VIRGINIA.

A GREAT iron foundry is about to be established on the northern limits of the city of Richmond, by Messrs. William E. Tanner and Alexander Delancey, of the firm of William E. Tanner & Co.

THE Central Virginia Iron Co. will soon begin to build a blast furnace near the Riverville mines, in Amherst county, Va.

THE Crozier Steel and Iron Works, with a capital of $1,000,000, has begun the location of its works in Roanoke. The works will be completed on or about the first of January. The capacity of the works, when in full blast, will be one hundred tons of pig iron per day.

ILLINOIS.

THE Columbian Iron Foundry and Machine Tool Works, Chicago, are placing in their establishment about $25,000 worth of tools, which will largely increase their capacity. Their new machine shop, the foundations for which are being already laid, will be 144x100 ft. and three stories in height. This company is building for its own use 6 planers 30x30, to plane six feet, have just placed in position a new boiler, and have recently added two new brass furnaces.

THE St. Louis Sewer Pipe Company is said to be the largest concern of the kind in the United States. During the past ten months they have made 500 miles of piping altogether. E. A. Sheble is president of the company.

THE North St. Louis Wagon Company has completed its organization, and is erecting extensive works, the dimensions of the main building being 35x60 feet, and the blacksmith and paint shop 60x150 feet. A new 40-horse power engine, saws, planers, and other necessary machinery have been purchased, and will be put in as soon as the building is in order.

AT Moline, an agricultural establishment employ 350 hands and make corn-planters, stalk cutters, check rowers, spring harrows and cultivators, &c. They use 800,000 feet of ash lumber each season.

THE Moline, Malleable Iron Works have one hundred and twenty-five hands employed and have just completed four new double annealed ovens, which gives a capacity of about two hundred and fifty tons per month. The company make a specialty of Hill's agricultural wrench and Hill's single-tree clip and hook.

D. DONALDSON, saw manufacturer, Rock Island, employs fifteen hands, making a specialty of saw-mill saws, the product being some thirty five thousand dollars' worth annually. Mr. Donaldson claims that his circular saws will stand more feed than any other saw made. Have been tested to twenty-three inches feed each revolution.

THE monthly output of the Calumet Iron and Steel Company's works (before the strike) was about 22,000 kegs of nails, 1,800 tons of bars, and 3,500 tons of pig iron.

THE pipe mill of Reichelt, Sandford & Co., Chicago, is producing 200 tons of piping every month. The company have recently enlarged their works.

THE new wire mill of the Union Iron & Steel Co., Chicago, is in full operation, employing about 300 men. The output will be sixty tons of manufactured wire per day.

THE American Cutlery Co., Chicago, have recently added to their works between $3,000 and $4,000 worth of machinery. They employ 125 men.

A NEW steel-manufacturing city will be created by a Syndicate in the coal region of southern Illinois. It is said $1,500,000 has been expended in the purchase of mines and railroads.

MICHIGAN.

THE Big Rapids Wagon Company will soon begin business with fifty workmen engaged.

MISCELLANEOUS RECEIPTS.

TO GILD STEEL.—This metal may be gilded by means of a solution of gold ether. To do this a quantity of gold is dissolved in nitro-muriatic acid and then boiled until the liquid evaporates, when the residue is dissolved afresh in water, to which is added three times as much sulphuric ether. The liquid is then left for 24 hours in a bottle, tightly corked, after which time it will be seen to float on the surface of the water. If the steel is then dipped into it, it will become gilded immediately, and if designs have been painted on the surface of the metal with any varnish, a beautiful specimen of a steel and gilded surface is obtained. For other metals the galvanic process is employed.

TO MAKE A FUSIBLE WAX.—A firm and fusible wax for ornaments and inscriptions put on loam moulds of bells, for instance, is made as follows: Melt at a gentle heat a mixture of 80 parts wax, 13 white pitch, 4 fat and 3 poppy oil. After a thorough stirring, filter through wool flannel.

FILLING HOLES IN WOOD PATTERNS.—A mastic for filling small holes in wooden patterns is composed of 50 parts resin, 40 whiting, 7 tallow and 3 yellow wax.

TO CLEAN PAINT.—When paint is washed with any strong alkaline solution, such as soda or strong soap, the oil of the paint is liable to be changed to soap, and the paint is seriously injured. To avoid this take some of the best whiting, and have ready some clean warm water and a piece of flannel, which dip into the water and squeeze nearly dry; then take up as much whiting as will adhere to it, apply it to the painted surface, when a little rubbing will quickly remove any dirt or grease stains. After this wash the part well with clean water, rubbing it dry with a soft chamois. Paint thus cleaned will look as well as when first put on, and the operation may be tried without fear of injury to the most delicate colors. It answers far better than the use of soap, and does not require more than one-half the time and labor. Another simple method is the following: Put a tablespoonful of aqua-ammonia in a quart of moderately hot water, dip in a flannel cloth and with this merely wipe over the surface of the woodwork. No rubbing is necessary. The first recipe is preferable, except where the paint is badly discolored.

MONEY AND BUSINESS.—Business has sensibly improved, the unseasonable cold weather, which was thought by many the chief cause of inactivity, having at last passed away. No doubt the open winter and the backward spring have greatly diminished the sales of many articles. But a much more important cause of embarrassment has been the indisposition or inability of those who depend upon agriculture for their support, in number about half of the entire population of the country, to purchase as largely from the profits of a short crop as from the profits of a full crop. Uncertainty as to the yield this year also has a depressing influence. The farmers, as a body, know more about the prospects than all the Bureau reports and elaborate accounts in newspapers can tell. Each man knows what the prospect is in his own fields, and if the future seems doubtful to him, his purchases are affected thereby. The Agricultural Bureau report for May 1 represents the average condition of winter wheat as 100, against 102 April 1, but the weather since the beginning of May has affected the grain very differently in different localities. As to spring wheat the weather has been more generally unfavorable, while the injury to corn has been such that a full yield seems at this time not probable. For some weeks to come, excepting as the harvest removes winter wheat from danger, these uncertainties must continue to affect trade. Another cause of depression has been added by the strike of many thousand workmen. When 60,000 or 80,000 men, most of whom have usually received and expended wages larger than the average, suddenly cease to have anything to spend unless from previous earnings, when the rolling-mills cease to consume iron and ore, coal, coke and other materials, and when other works in great number, which depend upon the rolling-mills for iron to be used in all forms of manufacture, are compelled to restrict operations, the effect upon the general trade of the country must soon be clearly perceptible. The striking fever, too, is often epidemic, and spreads without visible reason from one industry to others. These causes quite account for whatever depression in business has occured: indeed, it is an evidence of the general health of trade that it has not been more seriously disturbed than it has been thus far. It indicates that if the strikes should cease and the crops should turn out well, a decided improvement in business would speedily follow. The money market has been very little affected as yet. The shrinkage in domestic trade sets free for the time more money than is demanded by the excess of foreign imports over exports.

A TWENTY-EIGHT THOUSAND DOLLAR SHINGLE.—An exchange says that it isn't often that one finds a shingle worth $28,000, yet Joseph C. Palmer, a California pioneer, who died recently, once gave one that value. It happened in this way: He was a banker, and had trust funds in his hands amounting to $28,000. It became necessary to draw the money at once, and Mr. Palmer's consent was necessary, but he had been called away to attend to some duty in a lumber yard, some mile or more from the bank. Thither the depositor hastened and made known his wants, and the necessity of having them attended to immediately. Mr. Palmer could find neither pen, pencil, ink nor paper; but without a moment's hesitation he picked up a shingle, borrowed a piece of red chalk, and with it wrote a check on the shingle in large, distinct letters for $28,000. This was good when presented for all the money the depositor had in the bank, and it proved an exceedingly good advertisement for Palmer.

JUDGING OF STEEL.—In a lecture by Mr. Henry Seebohm, delivered before the Cutlers, Company, of London, England, occurs the following: "I may tell you that for the last ten years no steel has been sold by the firm of which I am a member of which we did not know the chemical analysis of all the important ingredients except carbon. We do not analyze for carbon, because we find that by long experience the eye can judge of the percentage of carbon in an ingot of cast steel of the highest temper from the appearance of the fracture more accurately than the chemist can ascertain by any method of analysis hitherto discovered."

"BLUE GRASS ROUTE OF OHIO."—The Cleveland, Akron and Columbus Railroad.

MECHANICAL RECEIPTS AND ITEMS.

Tin Plate Cuttings.

The following method of utilizing tin-plate cuttings has been proposed: The cuttings are exposed to an oxydizing heat in a scaling furnace, whereby the surplus tin and the tin that is bound up with the iron is oxydized When this is done, the scaling operation is suspended, and by that time the cuttings have covered themselves with a brown fragile crust, the upper part of which consists of peroxide of zinc, and the lower part of magnetic protoxide of iron. This mass is placed under rollers, whereby a white powder is produced, which, being sifted, may be worked for tin. The metal derived from this process is entirely free of sulphur and arsenic. The iron cuttings that proceed from the scaling furnace may be turned into wrought iron, which may be successfully turned to account in precipitating copper.

Cleaning Brass.

The government method prescribed for cleaning brass, and in use at the United States arsenals, is claimed to be the best in the world. The plan is to make a mixture of one part common nitric acid, and one-half part sulphuric acid in a stone jar, having also ready a pail of water and a box of saw-dust. The articles to be treated are dipped into the acid, then removed into the water, and finally rubbed with sawdust. This immediately changes them to a brilliant color. If the brass has become greasy, it is first dipped in a strong solution of potash and soda in warm water; this cuts the grease so that the acid has free power to act.

To Case-Harden Small Articles.

A quick mode of case-hardening small objects sometimes employed is that in which prussiate of potash is employed. The iron is well polished, and heated to a dark red heat. It is then rolled in a box containing powder of the yellow prussiate of potash; or, instead of being rolled, the powder may be sprinkled upon it. In either case, the powder will melt on the surface. The iron is then heated to a bright red, and is plunged into cold water. The powder of the prussiate of potash to be used for this purpose is obtained by exposing the crystals to a gentle heat in an open iron box or pot, for the purpose of evaporating the water contained in them. The remainder will be a white powder.

Mild Steel in the Work Shop.

The occasional failure of steel plates in boiler and other work is generally attributed to want of sufficient information on the part of the workmen. To prevent, as far as practicable, the possibility of failure in steel plates, caused by deficient information as to the proper method of treating this material, the Steel Company of Scotland has published and directs the attention of the users of the steel to the following rules:

"1. Welding: In welding mild steel plates, it is not necessary to heat them to the same high temperature as in the case of iron. Instead of a 'welding heat,' a bright yellow heat is sufficient; and if flux is required, it need only be three parts clean sand to one part common salt, moistened, and thrown on the parts in the fire. We recommend that the weld be of the V form, in preference to the lap, and that it be treated in the usual way—that is, lightly hammered on the V part. After the weld is made, and while the heat is good, the parts near and on either side of the weld should also be lightly hammered. In making the weld, the fuel should be used free from sulphur, otherwise red shortness may result.

"2. Flanging: In flanging, care should be taken in the local heating that the parts are not overheated, and that no hammering or work is put upon them while at a black heat; further, it would be well if work could be continuous until each flange is completed, or, if the plate has to be laid aside before it is finished, it should be protected from chills, if it is not convenient to keep it warm.

"3. Annealing: After completing either welding or flanging, the whole piece should be heated to a cherry-red heat, and slowly cooled.

"4. Orders: In ordering steel plates care should be taken to state the purposes for which they are to be used, especially in cases where they are required to weld and flange."

A CIGAR manufacturing firm in Pittsburgh has perfected a machine which is said to do away with the old style of cigar making by hand.

PRACTICAL MECHANICS.

Gear Teeth.

All spur and bevel gears in running form natural curves on the working sides of their teeth by wear. These curves are controlled by their various sizes and pitches; that is, a small and a large gear running into one another form of wear different curves when of the same pitch or coarseness of teeth. As gears of different pitches or coarseness of teeth form larger or smaller radius curves on the working sides of their teeth, gear teeth should have as near as possible the curves on their sides when made, to comply to the natural curves formed on them by their wear in use to secure good and perfect running gear. The working or wearing sides of the teeth of gears running as they wear to their natural forms, have but one curve from their roots to their points, and the teeth have a bearing on each other of their whole side surfaces in rolling in and out from each other, but if gears are of any considerable difference in size running together, the curves formed by wear will be somewhat different from each other. It is well to have the peripherical corners of all rotating gear rounded off in the form of a small quarter circle, that the bottom of the sides of the gear teeth may have a small curve formed to give increase of strength to the gear teeth. Thus the outside measurement of the points of two adjoining teeth should not exceed the width of two adjoining spaces, and the one tooth between them at the bottoms of the gears which are to run together. Cases are very seldom found requiring any change from the above-named proportions of the form of gear teeth. In all cases where there are to be quite small and quite large sizes of gears run together, whether spur or bevel, the large size gears should be made 2½ per cent. larger than the pitch size calls for, and the said percentage diminishes the sizes of the pairs of gears approximate to each other in size, to compensate for the variation of the divergence of the center lines of the teeth drawn from the axes of the smaller and larger gears, between the bottoms and points of the teeth, as will clearly be seen in drawing gears of different diameters of the same pitch or number of teeth to the inch in diameter, whether they be of fine or coarse pitch. The form or curves of the sides of spur and bevel gear teeth should be made as shown by their running together and wearing into their natural curves and forms; thus spur, bevel, worms and rack gears can all be made to run at high velocities when required, and run without noise and trembling.

The Manufacture of Alloys.

Many combinations of metals are required in the arts and their exact composition is of value as well as directions for their production, and some of these are so necessary that they should be carefully observed. 1. The melting pot should be redhot (a white heat is better,) and those metals first placed in it which require the most heat to fuse them. 2. Put the metals in the metal pot in strict order, following exactly the different fusing points from the highest degree of temperature required down to the lowest, in regular sequence, and being especially careful to refrain from adding the next metal until those already in the pot are completely melted. 3. The molten mass should be vigorously stirred with a stick, and even while pouring it into another vessel the stirring should not be relaxed. Another hint is to use a little old alloy in making new, if there is any on hand, and the concluding word of caution is to make sure that the melting pots are absolutely clean and free from any traces of former operations. Soft Alloy—This alloy will adhere so firmly to metallic, glass, and porcelain surfaces that it can be used as a solder, and is invaluable when the articles to be soldered are of such a nature that they cannot bear a high degree of temperature. It consists of finely pulverized copper or copper dust, and is obtained by resolving copper sulphate, or vitriol of copper, into its original elements, by means of metallic zinc. Twenty, thirty, or 46 parts of this copper dust according to the hardness desired, are placed in a cast iron or porcelain-lined mortar, and well mixed with some sulphuric acid, having a specific gravity of 1.85. Add to the paste thus formed seventy parts (by weight) of mercury, constantly stirring. When thoroughly mixed the amalgam must be carefully rinsed in warm water to remove the acid, and then laid aside to cool. In ten or twelve hours it will be hard enough to scratch tin. When it is to be used it should be heated to a temperature of 375 deg. C. when it becomes as soft as wax by kneading it in an iron mortar. In this ductile state it can be spread upon the surface, to which, as it cools and hardens, it adheres very tenaciously.

Alloy for Small Articles.—This alloy melts at a lower degree of temperature than the one just described, and is very hard without being brittle. Bismuth 6 parts, zinc 3 parts, and lead 13 parts. The three metals, after having been well melted and stirred together, should be poured into another melting pot and melted again. This alloy cools with remarkably clear-cut edges, and, if the articles made of it are dipped in diluted nitric acid, then rinsed in clear water, and polished with a woolen rag, the raised parts of the surface will have a fine polish, and the sunken parts a dark gray, antique appearance, which forms a pretty contrast. The proportions of the different metals dividing the alloy into 100 parts, are: bismuth 27.27, lead 59.09, zinc 13.64. Alloy for Small Casting.—Bismuth 6 parts, tin 3 parts, lead 13 parts. This alloy should be melted, run into bars, and laid aside till wanted, when it should be remelted. Bismuth, 3 parts, tin 1 part, lead 1 part. This second alloy for small castings is harder, and yet it is not brittle. It can be finished with a contrasting surface of white polish and dark gray, if it is washed in nitric acid, well diluted, rinsed, and polished with a woolen rag, as described in the alloy, for small articles, given above. Hard Solder for Gold—Gold 18c. (0.750 fine), silver 10, pure copper 10. Hard Solder for Silver.—Silver 66 parts, copper 23 parts, zinc 16. Solder for Platina. Pure gold, with one-half per cent. of platinum and iridium added. Hard Solder for Aluminum Bronze—Gold 88.88, silver, 4.68, copper 6.44. Another Hard Solder for Aluminum Bronze.—Gold 54.4, silver 27, copper 18.6. White Alloy.—This amalgam can be turned, filed, and bored; does not adhere to the mould, and will retain its polish a long time after exposure to the air. Cast iron 10, copper 10, zinc 80. Solder for Iron and Brass, which Contracts and Expands at the Same Degree of Temperature as the Latter Metal. Tin 3 parts, copper 39½, zinc 7½. Solder for German Silver.—German silver 5 parts, tin 4 parts. Alloys for Medals, Coins, etc.—Kraft's alloy, melting point 104 deg. C. Bismuth 5, lead 2, tin 1. Homberg's alloy, melting point 104 deg. C. Bismuth 3, lead 3, tin 3. Rose's alloy, melting point 93 deg. C. Bismuth, 2, lead 2, tin 2. Amalgam for Coating Plastic Castings—Tin 1 part, quicksilver 1 part. The quicksilver is to be mixed with the white of an egg, and added to the tin and bismuth when they are thoroughly melted and blended. The alloy while still hot forms a pasty liquid, which should be applied with a brush.

Saw Filing.

We may recognise general classes of saws, as reciprocating, circular, band and cylinder; and classes of teeth, as the V or cross-cut, the ripping tooth, the M or W and the hook, with their variations and combinations. Each of these requires special treatment, as distinguished from the others, and particular adaptation to conditions of speed, thickness, character of material and work, etc. The files used are triangular, flat or mill, round or gulleting, and special. There are many sizes of files and many grades of coarseness of cut. Whatever the style of saw or of tooth, it is imperative that all teeth of a kind shall be of uniform outline and dimensions—except in those cases (as in increment-toothed saws) where the teeth purposely increase in size in regular progression.

The elements of a saw tooth are its face, point, back and gullet. Teeth may vary in length, thickness, spacing, rake, kind of set, fleam, outline, direction, and depth and outline of throat and gullet. The saw teeth for office cutting, cleaning and planing are either solid (in one piece with the plate of the saw) or inserted. The cutting edge of a saw may have all teeth of a kind or several kinds in regular order. Teeth may be simple or compound. The gullet may be angular, notched, or rounded. The softer the material the greater the length of tooth among materials of the same general class. The more valuable the material and the greater the cost of power, the thinner the teeth should be; although, in general, the harder the material the thicker the teeth, to stand the greater strain. The more fibrous and porous the material, the greater may be the spacing, and the greater the necessity of deep throat or gullet. The more gummy the material, the greater the need of "set" or side clearance. The softer the material, the more depth, gullet, "hook" and "rake" may be given. The higher the speed, the greater the necessity for rounding the gullet.

In ripping fibrous material, the fibres are severed only once at a strike, while in cross-cutting, each fibre is cut off in two places at a stroke. The face of the file should be half as wide as the length of the face of the tooth. "Increment cut" files, or those in which the distance between the teeth increases from point to heel, are claimed to work cleaner and easier than those in which the spacing is regular. Hand-cut files are claimed to work better than any machine-cut, except the "increment-toothed." Many styles of special teeth are best sharpened with files of special section made on purpose for them; and some cannot be sharpened with any other than special files. Gumming may be done with punches, rotating steel cutters, or emery wheels. "Set" is of two kinds—"spring" or "bent" set, and "swaged" or "spread" set. Bent set teeth cut only upon one side; spread set teeth, cut on both sides, unless they are either bent or "sheared" as well as swaged. Each method of setting has its advantages and disadvantages, according to the conditions. Hand filing generally has the advantage of convenience in time and place. Machine filing has the advantage of greater regularity, ease and speed, and cheapness of work. Hand filing may be rendered more regular by the use of file guides. The same remarks may be made concerning the relative merits and demerits of hand and machine setting, as in reference to hand and machine filing.

"Jointing" (also called "ronnding" when applied to circular saws) is bringing the points of all the teeth down to the same line, so that no one tooth shall project lengthwise beyond the others, and thereby receive undue strain. It is generally performed with a flat or mill file, although it may be done by a plane rubber of emery or corundum, or a wetstone. It is best effected with the saw mounted in a special but simple jointing frame, or its equivalent. It is a very necessary operation. "Side-jointing" is a corrective or irregular setting, and prevents any uudue side projection of any tooth or teeth beyond the rest. It is more effective with swaged than with those bent for set. Saw teeth should be filed, set and jointed frequently, and gummed at regular and not widely distant times. The keener and more regular the teeth the cleaner and better they will work. The screeching of saw filing is proverbial, and yet unnecessary. A saw properly clamped and rightly filed need not "screech" under the operation. The blade must be firmly held close to the bottom of the teeth, and the file held firmly against the teeth. Rubber, leather, or even soft, thick pasteboard, betweeen the blade and the jaws of the clamp, will absorb most of the vibration and render the operation more nearly noiseless. Saw filing, to be effected regularly, neatly and rapidly, and with minimum wear of files, must be gone about in a systematic manner, in order that no tooth may be omitted or gone over twice. For instance, the faces of every other tooth may be gone over in regular succession, then either the backs of those teeth or the faces of the intermediates, and so on. In some cases the file is so shaped and held as to sharpen the back of one tooth and the face of the next one behind it. This frequently occurs with such small teeth as have no curved outlines, and is especially handy where the angle of the gullet is 60 deg., as is generally the case where the throat is sharp cornered. A saw file cannot well be too hard nor too sharply cut. To preserve its cutting powers it should not be so held and used as to strike the teeth against the edge of the saw tooth. It should not be thrown down carelessly nor knocked about among other files or tools. The corners are particularly liable to be stripped in the angles between the teeth. A saw cannot well be too hard if it is properly filed and used. Hardness is independent of "temper" or "elasticity." With the choice of teeth for special purposes, this article will have litte to do.—Robert Grimshaw in The Wood Worker.

Replating With Silver.

Almost any person can deposit silver on a few trinkets and cause them to present a silvery appearance, with the current from tne smallest and most inconstant battery, but the work on a manufacturing scale demands more skill and attention, and special preparation to insure success in the operation. We will first turn our attention to the articles to be plated. If these are spoons from which the silver has been much worn, it is probable that they are also somewhat battered, bent and scratched. Now, if we attempt to coat them with silver whilst in this condition, the coat of silver will bear all the imperfections enumerated above in an exaggerated degree. If the points of the bowls are worn thin, we must first file off the sharp edges, and by making the bowl a little smaller reduce it to a presentable shape and condition; if the shank is bent it must be brought to a proper curve. Scratches must first be scraped out with a sharp chisel or a similar steel instrument, and then rubbed down with water of Ayr stone, and the spoons thus roughly put into proper condition. But the old silver still remains upon them, and if left there would cause the deposit to be patchy. We must therefore get the old silver off. To do this, heat some oil of vitriol in a shallow evaporating dish, or one of enamelled iron, and when hot gently introduce one spoon at a time, hang on a bit of copper wire, move it to and fro, and drop in a few crystals of saltpeter. In a short time the silver will dissolve off without attacking the metal of which the spoon is made, unless exposed too long to the action of the acid. Great care must be exercised in this operation, for if the hot acid is spilt on the skin it will cause painful scalds; and when spilt on clothes entirely ruins them. When the silver has been all dissolved off, rinse the spoon in water, dry it, and then polish it to as nearly resemble a new spoon as can be attained. Forks and liquor labels are to be similarly treated, and it should be known that the operations of burnishing and polishing the deposited silver are facilitated by the finish given to the articles before plating them. The last operation will have left some greasy marks on the

articles from our fingers, and these must be got off by swilling the articles in a boiling hot solution of caustic soda or caustic potash, and rinsing them in water. They are to be next dipped for a few seconds in a solution of protonitrate of mercury in distilled water, or until they are lightly coated with a mere film of quicksilver in every part, then rinse them in water, and hold them in a piece of clean cotton or linen rag while attaching the slinging wires. If dull patches of mercury appear on the surface, rub them with the rag until the surface presents a uniform bright appearance; then put them at once in the plating bath, and hang them to the cathone rod by slinging wires, with the tops of the articles about one inch below the surface of the solution.

The operation of coating with mercury, preparatory to plating the articles with silver, is called "quicking," and articles are quicken to insure adherence between the coat of silver and the surface of the article. The solution for "quicking" may be prepared by dissolving some mercury in a mixture of one part nitric acid to three parts in volume of distilled water. This may take several days, for the operation is a slow one, but it must not be hurried by heat or the addition of more acid, and when completed the mixture must be diluted with distilled water in the proportion of one gallon of water to each ounce of mercury in solution.

When the articles have been expased to the current in the plating bath for a quarter of an hour, it will be advisable to remove them and test the adherence of the deposit with a scratch-btush in clean water. Brush them briskly all over until the creamy appearance has beeu removed and bright silver takes its place. If the silver strips off from any part remove all the loose silver, and dip the article again in the quicking solution, following it with the same precautions as before, and return the article to the plating bath. A good wearable coat of silver may be deposited in three or four hours, and during this time both the articles and the anode should be frequently moved to avoid stratification of the liquid, and consequent streaks on the silver.

When the articles have been sufficiently coated with silver they must be taken from the bath, rinsed in clean water, and made as bright as can be with a scratch-brush dipped in stale beer or weak linseed tea, then well dried in clean, hot sawdust, and finally burnished.

Facts About Coal.

BY PROF. C. D. WILSON.

The United States was, during the coal period, a low swampy level not unlike the lagoon districts of Louisiana. There were probably also scores of such swamps as the Dismal swamp of Virginia, which has an area of 600 square miles, and a depth of 10 to 30 feet of black mold or peat in a pasty state. These swamps differed in size as well as kinds of trees, reeds and ferns growing in them. Some marshes have slow flowing water; others stagnant water. Peat was accumulated by means of a microscopic plant (sphagnum palustre), and centuries were required to form a deposit of 30 or 40 feet. The swamps with flowing water would be mingled with foreign material, while the stagnant marshes would increase only in pure carbon. When a vast area was submerged, 100 fathoms of water above it, the pulpy peat bed, 30 feet thick, was reduced to a few feet of coal. The clay next to the coal absorbed enough carbon to become fire-clay. Pressure and heat resolved the upper layer of clay into slate and soap stone. We have thus underlying fire clay and overlying slate—the precise order in which we find nearly all coal. Then the land is raised to a higher level and becomes a permanent part of the continent. The swamps in which there were bayous or flows of water would give impure and slaty coal. The purest coal would be formed in the still waters of lagoons. Thus was formed, probably, the Briar hill coal, the block coal of Indiana, and the semi-block coal of Wilmington and Braidwood. Coal contains the greatest store or amount of heat in the smallest space, and yields it in the largest quantities at the least cost, and besides, it is most universally distributed through all countries. It is, in short, the cheapest source of that wonderful power, steam, which is the basis of the world's progress. No ordinary combustible substances have a heating power equal to it. The melting point of iron is 3,479 degrees (Fahr.), far beyond the heat power of wood. But coal has dominion over iron, and all its ores and forms, with a surplus heat power of wood. But coal has dominion over iron and all its ores and forms, with a surplus heat power of nearly 1,000 degrees. Had the heat power of coal been limited 1,000 degrees lower, or the melting point of iron established 1,000 degrees higher than it is, the entire human race would have remained savages or barbarians until this day. The concentration of heat power in coal can be in some sense appreciated when it is stated that the power developed in the combustion of five tons of coal represents the physical energies which a man is able to exert by working ten hours per day for fifty years.

The grain of coal, the drop of water, and the atom or iron are the triumvirs that have ushered in what is to be a grand millenium in human history. It is scarcely fifty years since the dawn of this era, yet in that time what a revolution has been wrought. If it had been prophesied 3,000 years ago that a grain of coal would some time evoke from a drop of water a power that can be so distributed and applied that it will do all the drudgery for the human race, so subtle and powerful that it will spin and weave, plow, plant, harvest, and carry the golden grain to market; dig canals and cellars; build railroads and forts; excavate mines and shafts; forge anchors and spider-webs of steel, in short, form and fashion all material for all uses, with what wonder would we have regarded the fulfillment of this prophecy. But all this was foretold in the constitution of coal and iron. These are prophetic of the human period in the earth's history—of the coming race of man who should combine these properties in most perfect action.

INDUSTRIAL SCIENCE.

All About Iron.

The foreign substances which iron contains modify its essential properties. Carbon adds to its hardness, but destroys some of its qualities, and produces cast iron or steel according to the proportion it contains. Sulphur renders it fusible, difficult to weld, and brittle when heated, or "red short." Phosphorous renders it "cold short," but may be present in the proportion of two to three one-thousandths without affecting injuriously its tenacity. Antimony, arsenic and copper have the same effect as sulphur, the last in a greater degree. The process of making cast iron depends much upon the description of fuel used; whether charcoal, coke, bituminous or anthracite coals. A larger yield from the same furnace, and a great economy in fuel, are effected by the use of a hot blast. The greater heat thus produced causes the iron to combine with a larger per centage of foreign substances. Cast iron for purposes requiring great strength should be smelted with a cold blast. Pig iron, according to the proportion of carbon which it contains, is divided into foundry iron and forge iron, the latter adapted only to conversion into malleable iron; while the former, containing the largest proportion of carbon, can be used either for castings or bars. There are many varieties of cast iron, differing by almost insensible shades; the two principal divisions are gray and white, so termed from the color of their fracture. Their properties are very different.

Gray iron is softer and less brittle than white iron; it is in a slight degree malleable and flexible, and is not sonorous; it can be easily drilled or turned in a lathe, and does not resist the file. It has a brilliant fracture, of a gray or somewhat bluish gray color; the color is deeper as the grain becomes closer. Gray iron melts at a lower heat than white iron. The color of the fluid metal is red, and deepens in proportion as the heat is lower; it does not adhere to the ladle; it fills the molds well; contracts less, and contains fewer cavities than white iron; the edges of the casting are sharp, and the surfaces smooth and convex. A medium-sized grain, bright gray color, fracture sharp to the touch, and a close, compact texture, indicate a good quality of iron. A grain, either very large or very small, a dull, earthy aspect, loose texture, dissimilar crystals mixed together, indicate an inferior quality of iron. Gray iron is used for machinery and ordnance purposes, where the pieces are to be bored or fitted. Its tenacity and specific gravity are diminished by annealing. Its mean specific gravity is 7.2. White iron is very brittle and sonorous; it resists the file and the chisel, and is susceptible of high polish; the surface of its castings is concave; the fracture presents a silvery appearance, generally fine-grained and compact, sometimes radiating or lamellar. When melted it is white, and throws off a great number of sparks, and its qualities are the reverse of gray iron; it is, therefore, unsuitable for machinery purposes. Its tenacity is increased, and its specific gravity diminished by annealing. Its mean specific gravity is 7.5.

Mottled iron is a mixture of white and gray; it has a spotted appearance; it flows well, and with few sparks; its castings have a plane surface, with edges slightly rounded. It is suitable for shot, shells, etc. A fine mottled iron is the only kind suitable for castings which require great strength, such as beam centres, cylinders and cannon. The kind of mottle will depend much upon the size of the casting.

Besides these general divisions, the different varieties of pig iron are more particularly distinguished by numbers, according to their relative hardness.

No. 1 is the softest iron, possessing in the highest degree the qualities belonging to gray iron; it has not much strength, but on account of its fluidity when melted, and of its mixing advantageously with old or scrap iron, and with the harder kinds of cast iron, it is of great use to the founder, and commands the highest price. No. 2 is harder, close-grained, and stronger than No. 1; it has a gray color and considerable lustre. It is the character of iron most suited for shot and shells. No. 3 is still harder than No. 2. Its color is gray, but inclining to white; it has consierable strength, but it is principally used for mixing with other kinds of iron. No. 4 is bright iron; No. 5, mottled; and No. 6, white, which is unfit for general use by itself. The qualities of these various descriptions depend upon the proportion of carbon, and upon the state in which it exists in the metal; in the darker kinds of iron, where the proportion is sometimes 7 per cent., it exists partly in the state of graphite and plumbago, which makes the iron soft. In white iron the carbon is thoroughly combined with the metal, as in steel.

Cast iron frequently retains a portion of foreign ingredients from the ore, such as earths or oxides of other metals, and sometimes sulphur and phosphorus, which are all injurious to its quality. Sulphur hardens the iron, and, unless in very small proportion, destroys its tenacity. These foreign substances, and also a portion of the carbon, are separated by melting the iron in contact with air, and soft iron is thus rendered harder and stronger. The effect of re-melting varies with the nature of the iron and the character of the ore from which it has been extracted; that from the hard ores, such as the magnetic oxides, undergoes less alteration than that from the hematites, the latter being sometimes changed from No. 1 to white by a single re-melting in an air furnace. The color and texture of cast iron depend greatly upon the volume of the casting and the rapidity of its cooling; a small casting, which cools quickly, is almost always white, and the surface of large castings partakes more of the qualities of white metal than the inferior. All cast iron expands at the moment of becoming solid, and contracts in cooling; gray iron expands more and contracts less than other iron. The contraction is about one-hundredth for gray and strongly-mottled iron, or one-eighth of an inch per foot.

Re-melting iron improves its tenacity; thus a mean of fourteen cases for two fusions gave, for 1st fusion, a tenacity of 29,284 lbs.; for 2d fushion, 33,790 lbs. For two cases—for 1st fusion, 15,129 lbs.; for 2d fusion, 35,786 lbs.

Story of a Great Monopoly.

[From the Atlantic Monthly.]

[Continued.]

The effect of the discrimination brought about by the Standard Oil Company was well expressed by Mr. B. B. Campbell, a witness for the State of Pennsylvania, who, when asked what profit there was in refining, replied, "To any one paying the open rate of freight there would be a heavy loss, but with a $1.10 rebate on every barrel there would be a heavy profit." The New York Central, the Pennsylvania, and the Erie railroads and their connections, lost, between January and October, 1879, about $13,000,000 of freight earnings they would have had but for their alliance with the Standard. The latest annual report of the Reading company gives a great deal of space to these heavy losses. The president of the Baltimore and Ohio Railroad called the attention of the other trunk line presidents to its statements. They could not, he said, fail to embarrass the railroads before Congress, and to do them "most serious damage" before the bar of public opinion. He appealed to the trunk line presidents at their meeting on January 21, 1880, to reform "the wasteful and absurd rates on oil," which virtually for the Standard amounted to free transportation. His appeal was without effect. The presidents decided at that meeting not to alter their rates. The rebates given the Standard extend to nearly every State in the Union. These rebates are about equal to the average value of the oil at the wells. The railroads of the United States virtually give the Standard its raw material free. The Western railroads favor the Standard in the same way that the Eastern ones do. They refused competing shippers, in the days before these had been killed off, equal rates with the Standard, unless they did an equal business. The railroads create the monopoly, and then make the monopoly, and then make the monopoly their excuse. When the Lake Shore charged nominally eighty cents a barrel and thirty cents a hundred pounds to carry oil from Cleveland to Chicago, it did the business for the Standard at seventy cents a barrel and twenty-five cents a hundred.

It seems incredible that Americans should have been willing to do what the Standard, by means of these special privileges from the railroads, did to its competitors. The refineries at New York had often to lie idle while the oil was running on the ground at the wells, because they could not get transportation. The monopoly of the pipe lines which the railroads gave it made the Standard the master of the exits of oil from the producing districts. Producing themselves but one-fiftieth of the oil yield they stood between the producers of the other forty-nine fiftieths and the world. There was apparently no trick the Standard would not play. It delivered its competitors inferior oils when

they had ordered the high-priced article, out of which alone they could manufacture the fancy brands their customers called for. The Standard received as a common carrier from E. W. Coddington oil for transportation through its United Pipe Line, but, when he sold it to a New York dealer outside the Standard combination, refused to deliver it, at the same time shipping oil to one of this dealer's competitors in New York. The Standard controlled the pipes by which alone Mr. Coddington and all other producers could get to market. When the flow from his wells had filled his tanks, and he had to have them emptied, his application to the Standard's United Pipe Line, a common carrier, was met by refusal to move his oil unless he sold it to the Standard. The following extract from the stenographic report tells the story plainly enough.

Ques. Upon what conditions would they run it?

Ans. Upon condition it was sold to certain parties,—J. A. Bostwick & Co., members of the Standard.

Ques. At what price compared with the market price?

Ans. Below the market price.

Ques. Always below the market price?

Ans. Always below it.

H. L. Taylor & Co., of Petrolia, had wells producing 1600 barrels of oil a day. Their tanks at the wells were full. They owned other tanks, to which they could get their oil only through the pipes which the Standard owned and operated as a common carrier. They applied to it for transportation, and were refused. The wells could not be shut down for fear of water, and so thousands of barrels of oil ran into the ground. The Standard carried its point, for after that the firm sold all their oil to it, always twenty-two to twenty-five cents a barrel below the market price. H. Caldwell was another producer who had flowing wells and empty tanks, which the Standard refused to connect, and who had to sell his oil to it at prices ranging at twelve and one-fourth to eighteen and one-half cents a barrel below the lowest market rate. Lewis Emery, Jr., a producer of oil, was an owner in six different companies, all of which were denied transportation by the Standard, and forced to sell to it at its price. He said, "We go down to the office, and stand in a line, sometimes half a day; people in a line, reaching out into the street, sixty and seventy of us. When our turn comes we go in and ask them to buy, and they graciously will take it." This was known in the trade as the "immediate shipment swindle." Sometimes the Standard, after buying the oil this way, would take away a small part of it, and refuse to pay for the rest till it was shipped, months later. As an immediate result of these manipulations, the price of oil began a steady decline from $1.30 to eighty cents a barrel, in the face of an increased demand unequalled in the history of the trade. In 1878 oil went down to seventy-eight and three-fourths cents a barrel at the very time the shipments from the wells were 56,000 barrels a day, the largest ever made till that time. All this, as one of the largest producers testified, was because "we take our commodity to one buyer and accept the price he chooses to give us, without redress, with no right of appeal."

Hundreds and thousands of men have been ruined by these acts of the Standard and the railroads; whole communities have been rendered desperate, and the peace of Pennsylvania imperilled more than once. The thousands of men thrown out of employment in Pittsburg between 1872 and 1877 were actors in the Pittsburgh tragedy of July, 1877. The oil producers, in their memorial to Governor Hartranft, August 15, 1878, for help declared that "the Standard and the railroad companies leave to the people, whose creatures they are, but two remedies—an appeal for protection first to the law of the land, and next to the higher law of nature!"

Manufacture of Soap.

With reference to the fats and oils used, tallow produces a good hard soap. Butcher's fat can in some places be obtained very cheaply, and works satisfactorily. Palm oil saponifies well, but used alone and unbleached gives rather too high colored a soap for some purposes. Cotton seed oil used in conjunction with tallow or palm oil makes an excellent soap, and is cheap; about 50 per cent. can be substituted for tallow and a hard soap produced. If used alone the soap is good and lathers very freely, but is rather soft for some purposes. Cocoanut oil makes a beautiful pure white hard soap, and also saponifies very readily; made perfectly neutral, nothing could be better for washing silks, laces, etc. For common soap there are many greases and oils that can be used. Bone grease, the "foots" from cottonseed oil, and grease removed from wool washing, all can be saponified in this manner, and a very cheap and yet serviceable soap produced. In using alkali in conjunction with soap for scouring, discharging acid, etc., pure powdered caustic soda can often be substituted to advantage and economy for soda ash or soda crystals, as it works more quickly and effectively. There is a prejudice against the use of caustic soda for this purpose, as the article as at first produced was often contaminated with iron, sulphides, etc. Of course also the caustic soda must be used in moderation; one-fifth or one-tenth part, as compared with soda ash or soda crystals, is amply sufficient. Neither caustic soda, soda ash nor soda soap should, however, be used for washing wool or woolens, as potash and potash soaps are in every respect superior for these purposes.

MINES AND MINING.

THE British output of coal last year amounted to 154,184,300 tons, and to do this amount of mining 495,000 men were employed.

THE best bituminous coal lands in Pennsylvania, situated near railroads, will bring as much as four hundred dollars per acre.

NEW coal mines are being opened in Walker County, Alabama.

THE total amount of anthracite and bituminous coal produced in the United States during the calendar year was 79,905,000 tons. Pennsylvania stands at the head, its production in 1881 being of anthracite 31,500,000; bituminous, 20,000,000; total, 51,500,000, Ohio second, with 8,250,000 tons, Illinois third with 5,000,000 tons, Maryland fourth with 2,300,000.

ONE third of the entire copper consumption of the world is obtained from about ten mines on the south shore of Lake Superior, being more than the entire output of Europe.

THE copper mines of Michigan have paid $1,550,000 in dividends since January 1, or a little over half a million more than the mining industries of any other state.

THE Ducktown copper mines, near Cleveland, Tennessee, yield, besides copper, about 50 per cent of iron.

THE gold mines of Georgia, according to the State geologist, yielded 250 per cent on the capital invested.

A DISCOVERY of tin ore has been made in the American Basin, Colorado, which is pronounced the richest ever found in this country; the vein is twelve feet wide and shows on the surface for 1,500 feet.

THE deepest mine in the world, according to Prof. H. Hoefer of the Academie Imperiale des Mines, is the Prizbram silver mine in Bohemia. The lowest depth is nearly 3,300 feet below the surface. At this depth the temperature of the rock is only 75·90° F.; and the temperature of the air 76·3° F.

THE Hibbard Antimony Company are taking out from fifty to sixty tons daily, at Lake George, N. B. The company owns some 800 acres of land the vein they are working extends over a mile, and in one shaft which is over 240 feet deep it is found to be five feet wide. All the ore finds ready sale here and in Europe.

THE Virginia sumac industry is on the increase. The value of the annual product is about $250,000.

THE Black Jack, Idaho, has yielded over $100,000, and is as yet little more than a prospect hole, so far as development is concerned.

ORE from the Stormy Hill mine, Idaho, is being taken to the arastra. Three men have put out in the neighborhood of 200 tons of ore that will yield them at least $15,000

THE Ore Fino mine, Idaho, has yielded a third of a million dollars; is but slightly developed; has magnificent hoisting works, and machinery in order; shows in the bottom of the shaft a 13 foot ledge of pay ore.

THE gold mining industry of the Lisbon mine, N. H., has grown to large proportions, more shafts will be sunk and a larger force of men put on than ever before. Gold was discovered there in 1866, a stone containing it was found in a wall, first directing attention to the matter.

SAN JUAN, Colorado, again looms up in having the richest and largest tin mine in the United States, and from prospects so far, bids fair to equal any in the world.

IT is predicted that within two years there will be 10,000 American miners in the State of Nuevo Leon, Mexico, and at least six smelting furnaces between Laredo and Monterey.

RAILROADS AND TRAFFIC.

CHIEF engineer Anderson expresses the opinion that the two ends of the Northern Pacific road will meet in Montana by July 1, 1883, only a little more than one year hence. Work is being pushed at several points along the line, and the present distance between the two ends of track is only 640 miles and daily diminishing. The completion of this great northern trans-continental line will mark a new era in the course of population and traffic in the northwest.

THE annual report of the Cincinnati, Hamilton & Dayton Railway Company shows that the net earnings for the year were $161,000, which is equal to about 4½ per cent. on the capital stock. But it was necessary to lay out the money so earned for necessary improvements in the way of equipment and the purchase of land, which was done to the extent of $140,000, in round figures. Other purchases, absolutely necessary, consumed nearly the entire net earnings. Had the plan of consolidation been perfected, $1,500,000 would have been provided, with which it was intended to make these improvements of the C., H. & D., or so much of that amount would have been used as was found necessary. The receipts for freight during the year were 11¾ mills per ton per mile, and the operating cost 10.2 mills per ton per mile. Included in this cost were $135,000 for additional ties and repairs of bridges and road bed. The road has been put in excellent condition, and the expense on this account another year may be greatly reduced. Mr. Jewett secured control of the property, with the Seney party, who bought over 9,000 of the total 35,000 shares of the stock, and he will, for a time at least, operate the road.

THE influx of immigration to the northwest continues, and the railways leading from the east to Chicago and thence to Minnesota are doing an immense business in carrying the new comers, each frequently moving several large trains in a day. The arrivals in Chicago are counted by the thousand daily—on some days reaching 6,000 or 8,000.

THE Burlington & Colorado Railroad is now completed to Denver, Col., making the shortest route between Chicago and that city, and having the advantage of being under the control of one management.

THE author of the following account of a strange railroad accident is not officially known, but it reads as if it had been written by Eli Perkins: "In a very mountainous Eastern State, in a very picturesque region, a line of railroad was in operation. It was built at one point upon the opposite sides of two mountains, with, of course, a valley between. A locomotive was stationed at the summit of each to pull up the trains. In one instance, when a long passenger train had reached within a short distance from the top, the heavy wire cable broke, and away it went, more rapidly than the imagination of the narrator, to the valley and up the other mountain, a half mile, like a flash, and the presence of mind of a passenger, a book agent by the bye, arrested it from running down the other side, as he checked it by the brakes. Anyhow, back went the train to the bottom, and again ascended the other side, thus see-sawing for the greater part of the day before the power of gravity overcame the momentum. The ladies shrieked, but the speed was such that the train left the sound behind, and the prayers that were uttered on the crest of one mountain were met by the returning train in the valley."

THE Bee Line & C. C. C. & I. announce half rates for the 3rd, 4th and 5th of July. The Pennsylvania Company announce cheap excursion tickets on their lines, good from July 1st to July 5th, inclusive.

IT is proposed to build a line of railroad from Memphis to New Orleans, along the east bank of the Mississippi, passing through Baton Rouge. Such a road would traverse one of the richest cotton and sugar districts in the South, and would, from the first, prove profitable, besides making a secure and permanent levee for a large district of country subject to periodical overflow.

A COSTLY eighteen-mile railroad is projected across the Isthmus of Chignecto to the Bay of Fundy, which will save 500 miles of inland navigation in Canada and 400 to the outward navigation.

ITEMS OF INTEREST.

The output of bullion from the Utah mines for 1881 was $10,000,000.

THE solar atmosphere contains sodium, iron, calcium, magnesium, nickel, barium, copper and zinc.

THE most common measure of capacity among the Romans was the amphora, nearly nine English gallons.

CAST iron is said to be permeable to certain gases at high temperatures, and to hydrogen gas even when cold.

NEW YORK is talking of water works 210 miles long to bring Lake George to the city, at a cost of $50,000,000.

IN 1881 the world's production of iron was 11,384,000 tons, or enough to girdle the world six times about with railroad tracks.

The total of coin and bullion in France is variously estimated at $1,600,000,000 to $2,000,000,000, much the greater part of which is known to be silver.

THE hosiery and knit goods industry in Philadelphia was established thirty years ago and today its annual product is of a value of twelve million dollars.

IN 1879 we imported something less than $2,500,000 worth of ostrich feathers. In 1881 we imported $5,493,000 worth and the demand is steadily increasing.

FINAL arrangements will be closed next month for the transfer of the Cotopaxi and Teneriffe mines, on Copper Creek, Mongollon Mountains, New Mexico, to a Chicago company.

WATER is not the only substance which expands in solidifying. Tin, zinc, bismuth, antimony, iron and copper exhibit the same property. With lead and cadmium the results are indecisive.

IN the beginning of the last century it was suggested to the mind of a Frenchman to use wood for the manufacture of paper, by observing that the nests of wasps were made of this material.

THE Dubuque shot-tower is built over an exhausted lead mine which affords a shaft of one hundred and thirty feet, thus saving the high tower above ground. The yearly product of this tower is about four thousand five hundred bags.

THE height of the East River bridge between Brooklyn and New York is 134 feet, 42 inches in the center span. The height of the bridge being less than the law requires, New York and Brooklyn will be liable for any damage resulting to shipping from this cause.

SOME one has discovered that flowers may be kept for a long time by putting them into a glass air-tight jar with a morsel of quicklime wrapped in oil silk at the bottom. In this way they may be indefinitely preserved, even if the jar is opened from time to time.

THE wealth of Colorado is developing almost fabulously. In the southwest section of the State, silver has been found to exist in all the mountains, and already some 5,000 claims have been located. The ore yields from $70 to as high as $300 per ton and miners are flocking to the region in multitudes.

THE manufacturers of rubber mats, matting, etc., are somewhat perplexed by the rise in the crude material, which, from 75 cents per pound but a few months ago has gone up to $1.20 per pound. This is attributed to a "corner" by a handful of speculators who have bought up the shipments. Nearly all the supply of crude rubber is from Brazil, and the gathering by the natives has not been as large of late as it ordinarily is.

A PARTY of Eastern men in search of healthy and profitable homes, have selected Oroville, Butler Co., Cal., purchased foothill lands for the raising of fruits, and are erecting a canning establishment. The climate of this section is delightful; oranges, grapes, pears and other fruits are ripe in February, and the industry, it is anticipated, will not only prove highly remunerative, but will attract fruit growers and canners to such an extent as to make the foothills of Butler County the fruit and canning El Dorado of the country.

GIGANTIC HYDRAULIC UNDERTAKING.—The Hollanders seem untiring in their efforts to reclaim land from the domain of the sea. Their latest efforts in this direction are being directed towards the annihilation of the Zuyder Zee, thus making available for agricultural purposes a large extent of country. This is an immense undertaking. This gulf of the sea was formerly a lake, but, by an inundation of 1282, it was united to the German ocean. To make sure work, or at least to reduce the probabilities of failure to the minimum, civil engineers have been busy for ten years past in perfecting plans and making estimates. It is reported that this preliminary work is now completed, and that the labor of building the walls will soon be begun. A dyke about twenty-four and one-half miles in length will be constructed of sand and faced with clay, reaching sixteen feet above the level of the sea, which will make it six and one-half feet above the highest tide. The thickness of the dyke will be such as will enable it to repel the heaviest seas. Operations will begin at four different points, and the calculation is to have it completed in from seven to ten years, at a cost of forty-six million dollars. The experience of the past has given the Hollanders such skill and knowledge in this peculiar work that it is safe to infer that they are not entering upon a chimerical scheme. When completed the territory which will be added to Holland will afford her crowded and industrious population an opportunity to expand which has long been needed.

VALUABLE TEXTILE DISCOVERY.—A German chemist has, according to an English paper, invented a process which is to be to woollen and cotton goods what electrotyping is to common metals and stucco is to brick and mortar. The modus operandi is as follows: Silk waste, ravellings, and similar valueless refuse are placed in a clear solution of caustic soda and potash, by which they are rapidly dissolved. The solution is then diluted by the addition of distilled water, more or less, as the "plating" is to be heavy or light. The cotton or linen fabrics are then placed in a bath of this liquid, in which they are said rapidly to become coated with the silk, when they are taken out and dried. This process is repeated a number of times, the bath being diluted each time. Finally the goods are left for two hours in a strong bath of sulphuric acid, in which they are kept in constant motion, after which they are thoroughly rinsed with water, pressed hot, beaten and stretched, to bring out the lustre and gloss, just in the same way as all silk goods are said to be treated. By this process it is claimed that not only cotton and woollen, but what is apparently more likely, dull, low-priced silks can be treated with a solution of better and more lustrous silk, and be rendered scarcely distinguishable from the best goods. The precipitated silk is said to adhere firmly, not only to silk so treated, but also to cotton and linen.

WHAT ARE CORNERS?—The mistaken idea appears to have crept into the minds of a great many people, that "corners" are the result of the manœuvres of a few unscrupulous men, possessing large capital and credit; whereas, "corners are made possible only through the greediness of large numbers of people scattered over the country who, possessing little money or credit, try to add to that little by selling what they do not own, and never expect to own, or, in other words, selling the property of other people. These sellers, often scattered from Minnesota to the Carolinas, and from Maine to Louisiana, each not knowing of the other's sales, occasionally through their agents sell an aggregate of stuff for delivery in given months ten-fold greater than the supply; and as this supply is often owned by speculative capitalists, it is not strange when the month rolls around in which the contracts mature, that the efforts of these people to buy back the property they have sold belonging to others should induce the real owners, who are usually on the spot, to fix a price a price for it proportionate to the excessive demand thus developed. And in this way "corners" are created; in this way the sellers lift themselves by their own petard; and in this way greedy people at a distance from the scene of operations, and anxious to get money without working for it, lose the little they have.—*N. Y. Produce Reporter.*

THE number of metals now known is seventy-seven.

When writing to advertisers mention this paper.

REVIEWS.

Vignettes from Nature. By GRANT ALLEN, Author of The Evolutionist at Large. (No. 33 Humboldt Library). NEW YORK: J. Fitzgerald & Co. CLEVELAND: Cobb, Andrews & Co.

This work comprises a series of charming delineations which are designed to illustrate, without formally arguing, the system of evolution. The observations as to animals, birds, and various natural objects are singularly acute, and the entertaining and instructive analogies drawn are evidently based on wide observation. Even a bed of nettles provides an entertaining contribution, and there is a particularly attractive article on wading birds. Other subjects are a mountain lark, fish, the donkey's ancestors, fallow deer, butterflies, etc. The habits as well as structure and appearance of animals are touched on in a lightsome way.

Edinburgh Review for April, 1882. American Republication. NEW YORK: Leonard Scott Pub. Co., 41 Barclay street.

The reputation of the Edinburgh Review is well sustained in the present number. The contents are: The Fall of the House of Stuart; Rossetti's Poems; The Empire of the Caliphs; The Comedy of Terence; Origin of English History; The Panama Canal; The Life and Writings of Edorado Fusco; Tweeddale's Ornithological Essays; Sir Thomas Brassey on the English Navy, and a sharply critical review of Lord Beaconsfield's Sketches and Literary Works.

Lippincott's Magazine for July. PHILADELPHIA: J. B. Lippincott & Co.

The July number commences a new volume of this excellent and entertaining magazine, abounding with graphic articles and effective stories. Among the many contents are a sketch on black bass fishing in the least frequented streams of the Adirondacks, finely illustrated; "An Afternoon in a French Hamlet," by Anna Bowman Blake, gives an animated description of peasant life amid the beautiful scenery of the forest of Fontainebleau. "The Tiger of the Sea," Love of Fireworks, a July Story, Fairy Gold, the Coal Mines of the State of Dade, Like Cures Like, Kineo: the Legend of Moosehead Lake, In the Heart of the Alleghanies, The Greater Wrong, Miss Matilda Jane and the Minister, and Walks with Bryant. The number concludes with racy monthly gossip and a review of the literature of the day.

CENTER OF THE WHEAT PRODUCT.—Thirty years or so ago the centers of the wheat product were New York in the East and Virginia South. In 1849 the Atlantic coast produced 51,657,020 bushels of wheat, or 51.4 per cent. of the whole crop. In 1876 it produced only 56,480,500 bushels, or 19.6 per cent. of the crop of the country. The central belt produced 43,522,646 bushels in 1849, or 43.3 per cent. of the crop. In 1876 this section produced 118,122,000 bushels, or 40.8 per cent. of the crop. In 1849 the trans-Mississippi belt produced 5,306,278 bushels, or 5.3 per cent. of the crop. In 1876, 114,745,000 bushels, or 39.6 per cent. of the whole crop of the country. In 1880 the West produced more than half the wheat of the country, the center of wheat production being a line running north and south, touching the Mississippi at St. Louis. The present year the center of production will probably be a north and south line entirely west of the Mississippi. In the statement made above, the Atlantic States comprise the coast States, including Pennsylvania and the Virginias to the Ohio river. The second and third sections are separated by the Mississippi river.

LACQUERING OF BRASS.—The lacquering of brass work and dipping after the approved manner is a process to prevent oxidation, and so protects brass objects against climatic influences. The effect of dipping is to change the dull reddish hue of castings to a bright tint or brass color; the burning liquid into which the brasswork is dipped hisses and bubbles upon the casting as it is lifted from the bath, removes all impurities, and leaves the yellow metal perfectly clean. So powerful is the cleansing agent, that it commences to simmer, and becomes green as the brass work is removed to the contiguous water-bath, in which it is thoroughly washed and made ready for further treatment in the process of finishing.

SCIENCE AND INVENTION.

SAFETY HEATING CAR.— A Holyoke man has invented a new safety car-heating system, designed to do away with the stoves in railway cars. A generator of steam is placed in the baggage car, and the connecting pipes transmit the steam through the train. The ingenious points of the invention are the successful surmounting of the obstacles heretofore never overcome. The pipes from the baggage car are carried through the top of the cars and drop to position under the seats. The couplings are brass valves screwed on to the pipes and supported from the end of the car by a hanger with a pulley. When two cars are joined, these couplings slip into each other and push back both valves, allowing passage to the steam. When the cars are separated, the pulley on which the couplings rest and which slides on the hangers is pushed up by a connecting rod, the couplings part and the valves close by their own weight.

INSTANTANEOUS FORMATION OF STEAM.—Messrs. Serpollet, Freres & Co., of Paris, have patented an invention for the instantaneous formation of steam, which permits of its use at once in the cylinder of the engine. A pump sends the required quantity of liquid between two plate surfaces, which are heated, and between which there is only a capillary space. The liquid spreading in a thin layer evaporates at once, without going into the so-called spheroidal state, and this steam acts in the cylinder as fresh formed steam. The speed of the pump is regulated by the engine, the pump being connected with the shaft of the engine.

MARKETS.

Office of TRADE REVIEW AND WESTERN MACHINIST.

FRIDAY EVENING, June 23.

FINANCIAL.

The demand for money during the week has been fair, and it has been freely supplied by the banks at 7 to 8 per cent. On prime collaterals money is obtained at 5@6 per cent on call and 6 per cent. on 2 and 4 months' time. The mercantile demand for Eastern exchange is good, and with light receipts the market is strong at par@1.20 per cent. premium buying, and 1.20@1.10 per cent. premium selling. Some currency has been shipped to New York. There has been a quiet market for local securities.

IRON.

The unsettled feeling prevailing disturbs local trade. The demand for pig iron has not increased, but consumers' demands have largely encroached on the available supply. The output of good brands of Foundry finds ready sale at steady prices. Foundry irons generally are stronger. The last few days, owing to the changed phase of the strike, holders have been inclined to advance their asking prices. Mill grades are dull and weak, and prices are rather nominal, quoted $20 to $21 for Grey Forge at furnace. All the leading furnaces appear to be sold up this month largely into next month, and the demand which is based on actual requirements shows no sign of abatement. Even for mill irons the demand has been sufficient to prevent accumulation at furnaces. Stocks being light, the maintenance of the current demand to the end of July is likely to improve prices. There has been but a moderate demand for foreign iron. We quote Coltness $26.00 to $26.50, Glengarnock $24.00 to $24.50, Gartsherrie $25.50 to $26.00, Summerlee $25.00 to $25 50; Carnbroe $23.00 to $23.50; Eglinton $22.50 from dock, and $23 from yard. Spiegeleisen is in some demand, but asking prices are a shade higher, $35.50 being named. For muck bars there is little doing over $41. Prices for blooms are irregular. Charcoal Blooms, $72.50; Run-out Anthracite, $60@62.50; Scrap Blooms, $52.50@$55; and Northern Ore Blooms, $47.50@$50. For bar iron prices are steady and unchanged. Orders are readily placed at 2.6c. There is a heavy demand for plate and tank iron, and for early deliveries as much as 3.1c@3 2c. is realized. We quote 4c for Shell, 5c for Flange, and 6c for Firebox.

CINCINNATI--(Reported by Rogers, Brown & Co.) The pig iron market shows more strength in consequence of several liberal purchases of metal following the full resumption of work in the mills of this district. Some of the large agricultural buyers have also been in the market during the week. These facts, taken together with the heavy forward orders already booked by Southern furnaces, have given a firm foundation to the market. The tendency at the close of the week is upward, though there is no quotable advance in prices. There are still some elements of disorganization at work in the market, but they are not deemed important. Indications point to a season of fairly active buying, with present prices well sustained. The following are our quotations for four months: Hot Blast Foundry—Hanging Rock CC. No. 1, $27.00@$28.50; No. 2, $26.00@$27.50; Southern, No. 1, $26.00@@27.00; Strong Coke, No. 1, $24.00@25.00; No. 2, $23.00@$24.00; No. 3, $22.00@$23.00; Soft Stone coal No. 1, $23.00@24.00; No. 2, $21.00@$22.50. Forge--Strong, Neutral, No. 1, Mill, $20.50@$22.00; Cold Short, No. 1 Mill, $20.00@21.00. Car Wheel and Malleable Hanging Rock Cold Blast, $33@34; Hanging Rock Warm Blast, $27@29; Southern Car Wheel Iron $34@36; Lake Superior do. $31@33; Lake Superior Malleable, $31@$33.

CINCINNATI—(Reported by E. L. Harper & Co.)—We have had a very active week, and the number of orders booked aggregate a large amount. The Agricultural Works, in view of an immense business during the coming season, are in the market for a large amount of pig iron. Some of the furnaces are sold ahead for their entire production for the balance of the year. Should the anticipated revival and increase of railroad construction and equipment be realized, of which there is now a strong probability, a very active and strong market will prevail during the balance of the year.

COPPER.

Sales have been somewhat limited. We quote for Lake Ingot 18⅛@18¼c; Baltimore and other brands are obtainable at 17¾c@17⅝c. The strike among iron workers has had its influence in bringing orders within moderate proportions. A better feeling latterly prevails in the jobbing trade, and should good crops be assured, business is certain to be reanimated. The requirements for copper in manufactures is better than ever. In London the market is strong for Chili, though only an average business is being done. Manufacturers have made no change in prices. We quote: Bottoms 31c@32c; Braziers, 30c@36c; Circles, 33c@36c; Sheathing 28c, and Bolt Copper, 30c; Segment Sheets, 33c; Fire-box ditto, 30c.

LEAD.

A considerable quantity has changed hands. Market rates are dull, and barely steady sales have been made at $4.65@$4.67½; Refined has changed hands at 4¾c. The N. Y. Mining Journal remarks; "The block of 3,000 tons Richmond, which is coming forward, hangs over the market with depressing effect, and until disposed of will tend to unsettle values, especially as the distributing and manufacturing trades are dull. Bids of 4.55 cents have been declined for this lot, the asking price being 4.80." In London business continues light, with prices a little firmer. We quote Pipe, 7½c; Sheet 8c; Tin-lined Pipe, 15c; Block, 15c.

TIN AND TIN PLATES.

There have been but moderate transactions in large lots. The jobbing trade is satisfactory. We quote: Straits Tin, 21⅝c@21¾c, and Lamb and Flag, 22½c@32c, large lines. The London market is dull and prices weak. As to tin plates a large business has been transacted in Coke Tin, which is decidedly firmer at $5.20. We quote, large lines, ordinary brands, per box: Charcoal Bright, $6@6.25; ditto Ternes, $5.37½@5.50; Coke Tin, $5.20, and ditto Ternes, $5.12½@5.25.

SPELTER AND ZINC.

The restruction of production by the iron strikes continues to bring the sale of common Spelter within narrow limits, as lessening the demand for galvanizing purposes. The foreign market is cabled as being dull, and prices weak. Domestic is nominally quoted at $5.45@$5 50, and Silesian 5½c@5⅝c. Stolberg has been offered as low as $5.40. We quote Bertha Refined, 8c; and Bergenport 9¼. Zinc—Domestic and Foreign Sheet zinc in moderate request at 7 1-4 cents from store.

COAL.

The stocks of dealers are lower than the average at this period of the year, owing to the extended strikes. Shipments by lake continue on a fair scale. Freights are somewhat lower.

HARDWARE.

The volume of trade, though not answering the expectations of dealers, is fair. The demand for mechanics' tools and garden implements continues active. There has been a larger demand for nails, and the recently established price of $3.40 net for 10d. to 60d is firmly maintained. The manufacturers of augers, bits, chisels and drawing knives confirmed at their late meeting former prices and terms. The Phosphor-Bronze Smelting Co., Limited, of Philadelphia, are placing upon the market a wood-screw made from their phosphor-bronze. C. E. Jennings & Co., New York City, have issued a revised list of their mechanics' tools.

LUMBER.

The general improvement of business is telling on the lumber trade, although it is by no means so brisk as could be desired, although confidence is felt that should the anticipations of a good harvest be confirmed, it will stimulate purchasers. At present manufacturers add to stock merely to supply current requirements. There is a slight falling off in values of shipping boards. There is less firmness in prices of hard wood, especially for walnut culls, white wood and oak. Sales of quartered oak and maple flooring, dressed and matched, have been made considerably below quotations. Sizes of some woods are growing scarce. Receipts have been somewhat light. There is a good stock of cherry.

WOOL.

The wool market has been moderately active. Prices are barely steady. Ohio holders are asking 38@40c. In the Eastern market there has been more movement in fine delaine fleeces. We quote: Washed Ohio XX, 42@44; do X, 41@43; do No. 1, 45@46.

LUMBER.

PLANK, MIXED WIDTHS.
2 inch, 12, 14 and 16 feet, together.

A 1 and 2	$50
A 3	40
B	32
C	21
D	15
E	13

1¼ and 1½ inch.

A 1 and 2	$48
A 3	40
B select	32
C	21
D	15
E	13

BOARDS.
One Inch, mixed widths.

A 1 and 2 uppers	$44
A 3	36
B select	30
C	20
D	15
E	13

STOCK BOARDS.
12 Inches wide.

A 1 and 2	$45
A 3	38
B	32
C	21
D	16

STRIPS.
6 Inches wide.

A 1 and 2	$42
B	35
C	23
D	17
E	13
Norway Fencing Strips	17
Norway Flooring Strips	25

WORKED LUMBER
FLOORING.

Flooring—A 3	$42
B	38
C	24
D	20
Norway Flooring—A 3	28
C	22
D	18
Matched Drop Siding, 6 inches—A 3	42
B	38
C	24
D	20

Beaded Ceiling $2 higher than Flooring.

One half inch Bevel Siding—A 1 and 2	24
A 3	20
B	18
Ash Flooring—A 1 and 2	40

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Small, joists, 12, 14 and 16 feet	$15
18 feet and under	$16

Timber, larger than 8x8 special.
Timber, longer than 18 feet, adds about $1 per foot per M. extra.

Cedar Posts, large	30 00
" " medium	25 00
" " small	$15 to 20 00

SHINGLES, LATH AND MILL WORK

Shingles XXX	$4 50
Clear Butts	3 25
Lath	3 00

Surfacing, one side, adds $1.25; two sides $1.50
Matching, flooring and drop sidings, $2.50.

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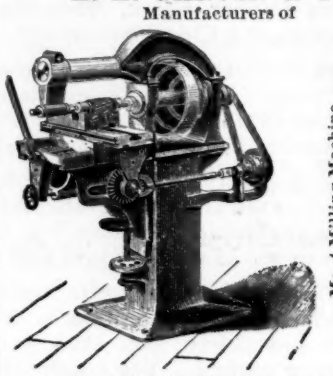

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Ship	" " 18 75
Heavy railroad	" " 19 50

Axes.

Hunt's	℔ doz $ 9 50
Lippincott's Crown	℔ doz 9 00
Cut More	℔ doz 9 00
Peck's Double Bit	℔ doz 22 00
" Champion Blade	℔ doz 11 00

Anvils.

Eagle, Amer.	per lb. 10c dis 20
Wright's	10¾c@11c
Armitage's Mouse Hole	9¾@9¾c
Trenton	10¾c
Wilkinson's	10¾c

Anvil Vise and Drill.

Millers Falls Co. $28	dis 20
Cheney Anvil and Vise	dis 25&2

Vises.

Solid Box, list of July 1, '79, dis 35

Solid "Crown" (A. H. Hildick)	40 to 100 lb. 15c net
Solid, Peter Wright's	15½
Solid, Wilkinson's	13½
Parallel, Parker's	dis 40
Saw Filers, Hopkins'	dis 10
	℔ doz $17.50, dis 10
Reading	dis 45&10
Cowell Hand Vises	dis 20
Richardson's Vise and Anvil	dis 25

Augurs and Bits.

	Dis
C S cut augurs	40&10
do do do bits	40&10
D C gimlet do Ives	dis 50
Snells bits	dis 40
Russell Jennings' augers	dis 16⅔ &10&10
Cook's pat augur	40&10

Animal Pokes.

Berea, per doz	4 00
Eagle, per doz	5 00

Apple Parers.

Domestic & Reading	℔ doz. $7 50
Turn Table	5 00

Bolts.

Machine	dis 6⅔
Bolt ends	dis 60
Plow	dis 50
Plow, R. B. & W	dis 40
Cast Iron Barrel Shutter, etc	dis 50&10
Cast Iron Chain (Sargent' list)	dis 60&10
Ives' Pat. Door Bolts	dis 50
Wrought Barrel	dis 55&10
Wrought Square	dis 55&10
W'g't Shut'r, all iron, Stanley's list	dis 50&10
Union Carriage	dis 70
Tire, R. B. & W., new list	dis 70&10
Stove, American Screw Co.'s	dis 40

Bellows.

	Dis
Blacksmith's com new list, 45 ℔ ct	
Moulder's new list, dis 25 ℔ cent	
Hand, new list, 25 per cent	

Butts.

	Dis
Wrought brass	65&10
Cast, loose joint	10&10
Pin, japanned and silver tipped	45&10
Wrought, fast joint narrow	40&10
Vrought fast joint broad	40&10
Wrought loose joint broad	45&10
Vrought table and back flaps	40&10
Loose joint, reversible	45&10

Cleveland Stamped Elbows

Genuine Russia Iron

4	inch per doz	4 50
4½	do do	5 50
5	do do	7 50
5½	do do	8 50
6	do do	9 50
7	do do	11 00

Planished American Russia Iron

4	inch, per doz	4 00
4½	do do	5 00
5	do do	6 50
5½	do do	7 50
6	do do	8 50
7	do do	9 50

Charcoal Iron

4	inch, per doz	2 00
4½	do do	2 50
5	do do	3 50
5½	do do	4 00
6	do do	4 50
7	do do	5 50

25 per cent

Chisels.

Hot and cold cutting	℔ lb 30
Railroad track	30
Machinists	30
Mallet head	50
Cape	50
Packing	50
Stone cutters	50

Crowbars.

Cast steel	℔ lb 8¼
Iron, steel points	6¼c

Cutlery, Pocket and Table.

Meriden Cutlery Co., table	net
Am. Miller Bros.' Cutlery Co	dis 25
Humason & Beckley, pocket	33⅓
Naugatuck Cutlery Co. list	net
Aaron Berkenshaw's pocket	dis 25

Crucibles.

Per number	4@ 4½

Chains.

Coil by cask,

3-16	¼	5-16	⅜	7-16	½
10¼	9	8	7	6⅛	6¼

Drills and Drill Stocks.

Blacksmiths', each	$2.50 dis 10
Blacksmiths', self-feeding, each	7.50 dis 20
Breast, P. S. & W	dis 20&10

Drawing Knives.

Witherby's	dis 65@10
Nobles Mfgr. Co	15
Adjustable handle	20

Emery and Emery Paper.

Regular Numbers	℔ lb 6c
Flour and F, F	℔ lb 4c
B. & A. Emery Paper	dis 30&5

Enameled and Tinned Ware.

Kettles	dis 50
Sauce Pans	dis 25
Tinned Sauce Pans	dis 50

Files.

Auburn	$5 to £. dis 35 pr cent
E. M. Boynton's, new list	dis 25
J. & Riley Carr	4.50 to £.
Johnson & Bro.	dis 30
Butcher's	4.50 to £.
Walter Spencer & Co.'s "Diamond"	4.50 to £.
Fisher's	4.75 to £.
Moss & Gamble	4.50 to £.
H. Disston & Sons (new list)	dis 40 per cent
Heller Bros.' Horse Rasps	
Nicholson	dis 25
New American	dis 40
Union File Co	dis 40

Grindstones.

Ohio	1¼@1½ ℔ lb
Nova Scotia	1¼@1½ ℔ lb

Hammers.

Maydole's	dis 15
Cheney's	dis 25
Hartford Hammer Co.	dis 20
Humason & Beckley	dis 50
Verree	dis 5
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50 and $1.75,	dis 25&10
Nelson Tool Works	dis 40&10
Warner & Noble's	dis 5
Kip's	dis 15
Yerkes & Plumb	dis 15
Wilkinson's Smiths' 11¼c ℔ lb	net

Hatchets.

Yerkes & Plumb:--Shingling, Nos. 1, 2, 3,	℔ doz $7 50, $8 00, $8 50, dis 25
Claw, Nos. 1, 2, 3,	℔ doz $8 25, $8 75, $9 25, dis 25
Lathing, Nos. 1, 2, 3,	℔ doz $7 50, $8 00, $8 50, dis 25

Nails.

10 to 60d	3 40
8 and 9d	25
6 and 7d	50
4 and 5d	75
3d	1 50
2d	2 75
3d fine	3 00
2d fine	3 75
⅞ inch	3 00
4d barrel	1 00
1¼ inch barrel nails	1 50
1⅛ do do do	1 75
1 do do do	2 50
⅞ do do do	3 00
Cut spikes, all sizes	25
Clinch nails, all sizes	1 75
Casing and box nails 75 cts advance	
Finishing nails, $1 25 do	
Tobacco nails, 50 cts do	

Nuts and Washers

Nuts, square	7c off list.
Nuts, hexagon	7c. off list.
Washers	6c off list.

Picks.

Railroad, 4 to 5 lbs	doz	$7 75
5 to 6 lbs		7 75
to 7 lbs		8 50
7 to 8 lbs		9 50
Railroad Tamping Pick 7 to 8 lbs	doz	13 50
Mill Picks per lb		75c

Rivets.

Iron	dis 40
Tinned	dis 40
Copper	dis 33⅓

Squares.

	Dis
Steel or iron, case lots	50
Try squares and T bevels	40

Spikes—WROUGHT

All lengths by ¼ inch	4½c
do do do 5-16	3½
do do do ⅜, 7-16 & ½ in	3¼

Shovels and Spades.

Ames' new list, July 1, 1881,	dis 15
Old Colony	dis 15
Remington's (Lowman's Patent)	dis 30
Rowland's	dis 40 and 10
Griffiths	dis 40&10

Saw Sets.

Boynton s patent X Cut, per doz $12; Hand Saw, per doz $10.	dis 20
Stillman's Genuine, per doz $3 50 and $5 50	dis 10
Stillman's Imitation, per doz $3 25	dis 20&10
Common Lever, per doz $2	dis 30&10
Leach's No. 0 $8; No. 1 $15;	dis 15
Hammer, Hotchkiss $5 50,	dis 10
" Bemis & Call Co.'s new patent	dis 40&5
Bemis & Call Co.'s Lever and Spring Hammer	dis 30&5
Bemis & Call Co.'s Plate	dis 10
" " Cross-cut	dis 12½
Aiken's Genuine	$13, dis 50&10
" Imitation	$7, dis 50
Hart's Patent Lever	dis 20
Disston's Circular	dis 40

Sad Irons.

From 4 to 10 lbs	per lb 3¾ net
Self-Heating	℔ doz $9 net
" Tailors	℔ doz $18 net
Gleason's Shield and Toilet	dis 25
Mrs. Pott's Irons, double pointed	dis 35
Mrs. Pott's Irons, square back	dis 35
Enterprise Star Irons	dis 40
Combined Fluter and Sad Iron	℔ doz $15, dis 15

Scales.

Hatch, Counter, No. 171	℔ doz. $42, dis 37½&10
Union Platform	$6, dis 45
Fairbanks'	dis 20
Buffalo Scale Co.	dis 20&5
Forsyth Scale Co	dis 25
Howe's	dis 20&10
Chatlilon's Eureka	dis 25
Family Universal	dis 50
Scale Beams	dis 33⅓&10

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.	

Planes.

Ohio Tool Co	dis 25
Sciota	dis 30
Bailey's Pat. Adjstble	dis 20@25

Rules.

Stanley	dis 66⅔ and 10

Sash Locks. Discount.

Payson Mnfg. Co. "Perfect"	42
Simmons' Sash Supporters	20

Hinges.

Champion double acting spring hinges	dis. 30
Screw & Strap 8@12 in.	$6. net
Gravity Locking Blind Hinges, Sargeant & Co.	70&10

Screws.

	Dis
Flat head iron or steel per cent dis.	30
Flat head brass	30
Round head iron or steel	25
Round head brass	20
Brass and Silver capped	40
Japanned, list of Plain Screws	20
Coach, patent Gimlet point, list per 100	60
Lag, taper points	60
Bed	10
Machine, flat head, iron	55
round head, iron	50
Bench, iron	55&10
wood, beech, per doz $3	10
wood, hickory	20&10

Valves. Dis.

Jenkins' Patent Gate Valves	35
" " Globe "	40
" Standard Packing "	20

Wrenches.

Coe's genuine	40 & 10
Coe's imitation wrought bar	60
Mechanics'	60 and 10

Wire.

Brass and Copper	dis 20
Bright & annealed, Nos. 0 @ 18	dis 50@52½
" " Nos. 19 @ 26	dis 60
" " Nos. 27 @ 36	dis 65
Coppered Nos. 0 @ 18,	dis 45
Galvanized, Nos. 0 @ 18, market list,	dis 40@45
Tinned, Nos. 0 @ 18,	dis 40@45
Cast steel	dis 40
Tinned Broom Wire, Nos. 18@25	dis 55
Annealed Fence, Nos. 8 and 9	dis 55@52½
Annealed Grape, Nos. 10 to 14	dis 52½
Galvanized Telegraph, Nos. 7 to 9	℔ lb 7¼c
Galvanized Telegraph, Nos. 10 to 11	℔ lb 8¼c
Galvanized Telegraph, No. 12	℔ lb 10¼c
Fence staples	℔ lb 5½@5¾c
Fence Staples, galvanized,	℔ lb 7@7¼c
Stubs Steel Wire	$7 00 to £
Barb Wire, painted	8¼c
Barb Wire, galvanized	9¼c
Crucible Steel Ropes from ¾ in. at 9c to 1¼ in. at	52c
Best Selected Iron Ropes from 3-16 in. at 3c. to 1¼ in. at	33c

Boiler Plates.

("Gaylord"--Standard Quality.)

C. No. 1	4 50
C. H. No. 1 Shell	4 75
C. H. No. 1, 50,000	5 25
C. H. No. 1, 55,000	5 75
C. H. No. 1 Flange	6 50
Firebox	
T. S., 60,000	(as per) 6 50
T. S., 65,000	(act of)
Homo. Steel, 70,000 (of Cong)	7 50
Heads, ¼c ℔ lb extra.	

N.B.—Eastern brands of boiler plate at from 2-10 to 3-10c ℔ lb less than above prices.

Sheet and Tank Rivets. "Norway."

All sizes	dis. 15

Boiler Rivets—"Albany."

⅛, ⅝, 11-16, and ¾ in. diam.	5 50

Boiler Makers' Tools.

Doty's Power Shears	net list
" Hand Lever Shears	net list
" Power Punch	net list
" Hand Punch	net list
Steel Screw Punch	net list
Iron Screw Punch	net list
Boiler Plate Rolls	net list
Buffalo Forges & Blowers	dis 20
Watson's "	net list
Spring Tube Expander	dis 15
Roller Tube Expander	net list
National Tube Cleaner	dis 20
Wire Flue Brushes	net list
Anvils—"Peter Wright"	12½ ℔ lb
Solid Box Vises	net list

Nuts, Bolts, etc.

Square & Hex. Nuts	6¾ off list
Washers	6¼ off list
Machine Bolts	dis 60
Bolt Ends	dis 60
Boiler Patch Bolts	net list

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch	dis 37½
"National" Standard Gauge 11 inch to 15 inch	dis 25
"National" Special Locomotive Tubes	net list

IRON AND STEEL.

Flat Bar.

1¼ to 4 by ¼ to 1 inch	2 85
4¼ to 6 by ¼ to 1 inch	3 00
1¾ to 6 by 1⅛ to 1¼ inch	3 25
1¼ &1¾ by ⅛ to ¾	3 00
1 & 1¼ by ⅛ to ¾	3 10
⅛ ¼ and ⅜ by ⅛ to ½	3 25

Round.

1 to 1⅞ inch	2 85
2 to 2⅝	3 15
2¾ to 3¼	3 45
3⅜ to 4	3 50
4¼ to 4¼	3 45
4¾ to 5	4 90

Square.

1 to 1⅞ inch	2 85
2 to 2⅝	3 10
2¾ to 3¼	3 45
3⅜ to 4	4 00
¼ to ⅞	3 00

Heavy Band.

1⅛ to 6 by ¼ and 5-16 inch	3 10
1 to 1¾ by ¼ and 5-16 do	3 15
⅜ to ⅞ by ¼ and 5-16 do	3 50
⅜ to ⅞ by ½ and 5-16 do	3 10

Half Oval and Half Round.

Wagon box iron ¼ and ⅜ 4 80

1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1⅛ to 6 by ¼ to 3-16	3 50

Hoops.

1¼ to 2, Nos 16 to 18	3 90
1¼ to 4 do 13 to 15	3 60

1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24	5 60
No 25 to 26	5 85
No 27	6 10
No 28	6 60

English Steel.

Best cast	℔ lb 15½c
Extra cast	16½c
Round machinery, cast	10c
Swaged, cast	18c
Best double shear	15½c
Blister, 1st quality	13c
Refined tool steel	16½c
Spring calking	7¼@7½c
German steel, best	11c
2d quality	10c
3d quality	9c
Sheet cast steel, 1st quality	15½c
2d quality	14½c
3d quality	12½c

American Steel.

Best brands of refined cast steel	12c
Crucible machinery	8c
Open-hearth ditto	5c
Hammer cast steel	9½c
Spring cast steel	7½c
Bessemer and open-hearth spring	5½c
Ditto plow	5½c
Steel boiler plate	6½@7c
Bessemer machinery	5 @6c
Spring and calking	7¼@7½c
Tire	5
Sleigh shoes	5

Bessemer Steel Tire.

¾ to 1 by 3-32	4½ ℔ lb
¾ to 1 by ⅛ to 5-32	4½ ℔ lb
¾ to 1 by 3-16 to ¼	4⅝ ℔ lb

Miscellaneous Cast Steel.

Auger and auger bit	8
Axle steel for wagons	8
Frog points and plates	9
Frog size bars	9
Pick, plain	7½
Mattock, beveled	10
Table cutlery	9
Trap spring steel	8½
Pike and cant hook	9
Coal and granite	8½

TINNER'S STOCK.

Tin.

Banca, large pig	per lb. 33c
Straits	" 25c
English	" 25c
Bar	" 27c

Tin Plate,

IC 12x24	charcoal	$ 7 00
IC 14x14	do	11 00
IX 14x14	do	14 00
DC 12½x17	do	17 00
DX 12½x17	do	6 75
DXX, 12½x17	do	8 75
DXXX, 12½x17	do.	10 75
IC, 20x28	do	12 75
IX. 20x28	do	14 50
IXX. 20x28	do	18 50
IC, 14x20, Best Roof		22 50
IX, 14x20,	do	6 25
IC, 20x28	do	8 25
IX, 20x28	do	12 00
IC, 10x14 Best Coke		17 00
IC, 10x20	do	6 00
		9 75

Solder.

Half and Half, in bars	17
No. 1 do	15
Spelter Solder	25

Pat Planished Sheet Iron.

[A]				per lb 10½c
[B]				9½c
Nos	10 to 14	15 to 20	21 to 24	25 & 26
Com	3-60	3-80	4-00	4-20
Char	5-60	5-60	6-00	6-20

Sheets over 28 in. wide ¼c extra

Zinc.

Sheet, cask	7½@ 7¾
Sheet, open	8@ 8½

Tinners' Tools & Machines.

Machines (P. S. & W.) list add	20
Tools (P. S. & W.)	add 6

Gas and Steam Fitters' and Machinists' Supplies.

Gas and Steam Pipe	dis 60,
Enameled Pipe	dis 65
Artesian Well Casing	net list
Hydraulic Tubes	net list
Malleable Iron Fittings	net list
Cast Iron Fittings	dis. 35
Globe Valves	dis. 35
Angle Valves	dis. 35
Check Valves	dis. 35
Safety Valves	dis. 45
Eddy Gate Valves	dis. 35
Steam Cocks	dis. 20
Service Cocks	dis. 35
Ball Gauge Cocks (net per dozen)	dis. 35
Compression Gauge Cocks	$15
Miss. Gauge Cocks	dis. 35
Register Gauge Cocks (net per dozen)	dis. 35
Cylinder Cocks	$15
Air Cocks (net per dozen)	dis. 30
Oil Cups	$2 75
Steam Gauges	dis. 30
Water Gauges	dis. 30
Scotch Glass Tubes	dis. 45
Steam Whistles	dis. 60
Iron Body Globe Valves	dis. 35
Iron Body Safety Valves	dis. 35
Iron Body Steam Cocks	dis. 35
Pipe Tools	special
Globe, Angle and Check Valves (Star's regrinding)	dis. 25
Mack's Injectors	dis. 25

Babbitt Metal.

No. 1	℔ lb 16
" 2	" 14
" 3	" 10
" 4	" 8

LEAD.

American,	℔ lb	5¼@5¼c
Bar,	℔ lb	6¼c net
Pipe,	℔ lb	7¼c dis 10 per ct
Sheet,	℔ lb	8c dis 10 per ct
Tin-lined pipe	℔ lb	15c dis 10 pr ct
Shot Drop 7c; Buck		8c
Chilled Shot		8c

COPPER.

Lake Ingot	18¼c
Baltimore	17¾@18c
Arizona	18c

Sheathing Braziers Copper, Bolts, &c.

Brazier's Copper, ordinary sizes, 16 oz. per sq. foot, and over per lb	30c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq foot, per lb	32c
Brazier's Copper, 10 oz. and 12 oz per sq ft. per lb.	34c
Brazier's Copper lighter than 10 oz. per sq ft. per lb	36c
Circles less than 84 inches in diameter per lb.	33c
Circles 84 inches in diameter and over per lb.	30c
Segment and Pattern sheets per lb.	33c
Locomotive Fire Box sheets per lb.	30c
Sheathing Copper, over 12 oz per sq. ft. per lb.	28c
Bolt Copper per lb.	30c
Copper Bottoms per lb.	31@32c

No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft.

Tinning.

14x18	per sheet 6c

All other size sheets, 2½c per square foot. For tinning both sides, double the above amount.

SCRAP IRON AND OLD METAL

DEALER'S SELLING PRICES.

	Net Tons.
No. 1 wrought scrap	$24
Sheet and hoop "	10@11
Cast scrap, (No. 1 heavy)	19
Cast Scrap (Stove Plate)	12

OLD METALS.

Old copper per lb	15c
No. 1 H. Brass per lb	14
Heavy yellow Brass do	12
Light Brass per lb	12
Scrap Zinc per lb	6
Tea Lead per lb	3
Heavy Lead per lb	4

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas Pipe.

Inside Diameter. Inches.	Plain, Price Per Foot.	Galvan or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛	08		.40	.24
¼	08	$0 11	.54	.42
⅜	09	12	.67	.56
½	11	15	.84	.85
¾	13⅓	19	1.05	1.13
1	19	28	1.31	1.67
1¼	27	40	1.66	2.26
1½	33	47	1.90	2.69
2	46	64	2.37	3.66
2½	75	1 00	2.87	5.77
3	95	1 30	3.50	7.55
3½	1 25	1 70	4 00	9.05
4	1 50	2 05	4.50	10.78
4½	1 75	2 40	5.00	12.49
5	2 25	3 00	5.56	14.56
6	2 75	4 00	6.62	18.76
7	3 75	....	7.62	23.00
8	4 75	....	8.62	28.00
9	6 50	....	9.68	34.40
10	8 00	....	10.75	40.64
12	12 00	....		54.65

Discount, 62½ per cent; galvanized, 62½ per cent.

BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb.

High Brass.

All Nos. not thinner than to No. 28, wider than 2 in. not wider than 14 inch	30c
All Nos. to No. 28, inclusive, and widths over 14 to 20 in. inclusive	35c
All Nos. to No. 28, inclusive, and widths over 20 to 30 in. inclusive	38c
½c per lb. advance on each No. above Nos. 28 to 38, inclusive.	
All Brass thinner than No. 8 is Platers' Brass at	53c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches	37c

Low Brass.

4c per lb. more than High Brass.

Gilding metal 8c per lb. more than High Brass.

Platers' or Gold Metal

In Bars	48c
Sawed	51c
Planed or Polished	54c

For Slitting.

Metal in width in. to ⅛ in. to No. 28, inclusive, 1c per lb advance.

Metal, in width 2 in. to 1 in., thinner than No. 28, 2c per lb. advance.

Metal, in width ⅛ in. to ¼ in. thinner than No. 28, 5c per lb. advance.

Metal ¼ in. in width and less, 10c per lb. advance.

Any of the above widths cut to particular lengths, add 7c per pound.

COAL,

WHOLESALE.

Wholesale f.o.b vessel at Cleveland:

Carbon Hill and Monday Creek	$2 65
Massillon	2 75@ 2 85
Brier Hill	3 25@3 75
Pittsburgh	3 00
Salineville	2 25
Tuscarawas	2 25

RETAIL.—Delivered.

Massillon Lump	$4 00
" Nut	3 75
Carbon Hill and Monday Creek, lump	3 75
Carbon Hill and Monday Creek, nut	3 50

75c less on cars by car load.

Anthracite Stove and Chestnut	7 15
Egg and grate	6 00

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15	7 50
11x14 to 15x24	8 50
16x24 to 20x28	9 75
15x34 to 24x30	10 75
26x28 to 24x36	11 50
26x36 to 26x44	18
26x46 to 30x50	14 00

DOUBLE THICKNESS

6x8 to 10x15	11 7
11x14 to 15x24	13 25
16x24 to 20x28	15 75
15x34 to 24x30	17 25
26x28 to 24x36	18 50
26x36 to 26x44	21 25
30x50	22 50
30x52 to 30x54	23 25
30x56 to 34x56	25 00
34x58 to 34x60	27 75
36x60 to 40x60	30 00

Dis 60 & 15 single, 60 & 20 double

OILS.

Pure Oils. packages included	
Sperm, winter bleached per gal	1 25
Whale, winter bleached per gal	63
Straits	50 @ 53
"A" oil for tanner's use	35 @ 40
Lard oil extra W S	1 03
do No 1 do	85
do No 2 do	70
Tallow oil	70@75
Neatsfoot oil pure	85
do No 1	80
Linseed oil, raw	57@59
do do boiled	60@62
Cotton seed oil white	64 @ 66
do do yellow	60 @ 63
West Virginia lubricating 28 deg	12c@15c
Pure Mecca	55@ 50
Paraffine oil winter pressed	25@ 30
Machinery	40
Engine	50
Miners' oil	40@45
Drilling oil	40

Hides and Leather.

Prime cured hides,	7¾
Green hides	6@6¼
Bull, scrubby, badly scored or damaged, cured, two-thirds price.	
Prime dry hides	13@14
Horse hides, green	$1 75@2 00
Horse hides, dry	$2 00@2 25
Prime cured veal calf,	12½
PrimeDeacon Skins, salted	65@70
Pelts, wool on	32@34
Fresh slaughter sheep	30@$1 50
Fresh slaughter lambs	50@60
Green calf skins	13
Hemlock rough	23@24
Oak harness	34@38
Oak sole	37@40
Union harness	31@34

Cleveland Business Directory.

Assayers and Analytical Chemists.

JUDSON, W, E, Ana ytical Chemist, 8 Cushing Block.

Bolt and Nut Works.

HOTCHKISS & GAYLORD, manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws.

Boiler Makers.

SMITH & TEACHOUT — (Established 1857.) Boiler, Tanks, Stills etc. 439 Broadway.

Bridge Builders.

BUCKEYE BRIDGE AND BOILER WORKS mfrs of Arch & Truss Bridges, Boiler Tanks and Oil Stills. Bet. Wasson St. and Case Ave.

Coal and Iron Exchange.

JACKSON IRON CO. Iron Ore and Pig Iron. Rooms 8 and 9. Fayette Brown, Gen. Agent.

RHODES & CO. Coal, Iron Ore an Pig Iron. Rooms 1 and 2.

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STRIEBEL, CHAS. manfac'r. of Carriages and Wagons and platform trucks. Horse shoeing and general blacksmithing .93 Woodland ave.

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts.

Church and School Furnture.

FAULHABER, GEO. manufacturer of School and Church Furniture. Fine Hard Wood work a specialty. 203 Ontario Street.

Custom Boots and Shoes.

ROONEY, JOHN manufacturer of hand-made Boots & Shoes, custom made and warranted 177 Ontario Street.

Carriage Repository.

GREENE'S, J. O., Carriage Repository, 408 Superior street and 52, 54 & 56 Rockwell street, dealer in Fine Carriages. Repair shop in connection.

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Cleveland Business Directory.

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Business Directory.

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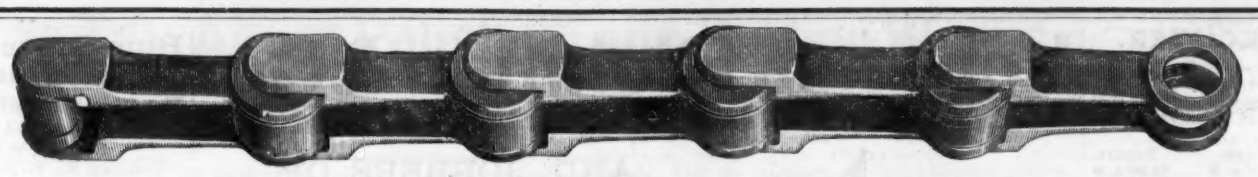

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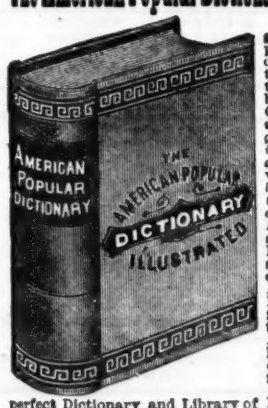

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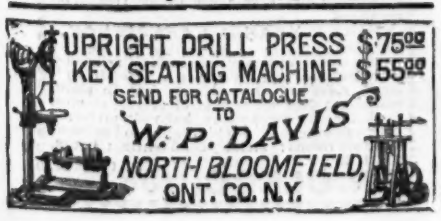

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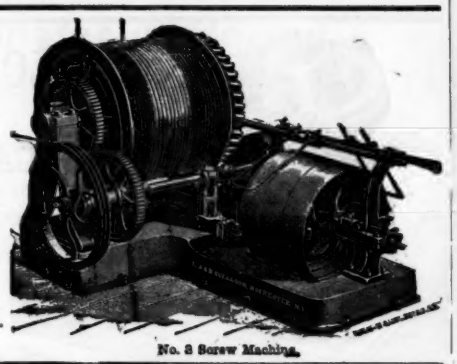
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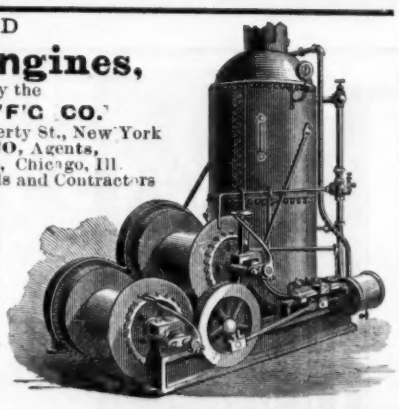

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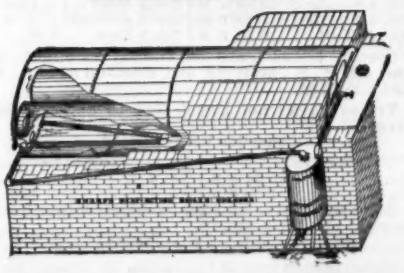

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	Arrive.	Depart.
No. 20 Limited Express	*1:35 A.M	*1.50 A.M
No. 6 Atlantic Express	*7:05	*7.30
No. 10 Buffalo Accom	11:00	11.15
No. 8 C. & St. L. Exp	*2:25 P.M	*2.55 P.M
No. 4 Special N. Y. Exp	10:10	10.35
No. 2 San. Div. Accom.	10:12	
No. 12 Conneaut Accom.		4.50
Nottigham Accommodation (Sundays only)	10.05 A.M 4.45 P.M	9.00 A.M 2.15 P.M
No. 18 Elyria Accom	8.50 A.M	

WEST BOUND TRAINS.

	Arrive.	Depart.
No. 13 Mich. Accom		6.40 A.M
No. 1 Special Chicago Ex.	*6.35 A.M	7.00
No. 3 Toledo Express	1.25 P.M	3.30 P.M
No. 21 St. Louis Express	*1.40	*2.05
No. 5 Pacific Express	*7.05	*7.35
No. 11 Conneaut Accom.	8.40 A.M	
No. 19 Pt. Clinton Accom.		5.00
No. 7 Michigan Exp.	*2.50 A.M	*3.05 A.M
No. 17 N.Y. & Chi. Ex.	12.23 P.M	12.33 P.M

Cleveland, Columbus, Cincinnati & Indianapolis.

ARRIVALS.

No. 2 Col. & Cin. & Ind'pous Ex.	*7 10 A.M
No. 8 C. T.V. & W. & Clev. Accom	10 30
No. 12 St. Louis & New York Exp.	*3 00 P.M
No. 4 Special Cin. & New York Exp	*3 40
No. 10 Wheeling & Cleveland Exp.	7 15
No. 6 Indianapolis & Columbus Exp	10 20

DEPARTURES.

No. 1 Cincinnati & Columbus Exp.	8 00 A.M
No. 11 Cleve, Indianap. & Wheel'g Ex.	7 10
No. 3 St. Louis & Cincinnati Ex.	†2 00 P.M
No. 5 Night Express,	*7 25
No. 7 C.T.V. & W. & Col. Accom	4 00

†This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

Cleveland, Tuscarawas Valley & Wheeling.

ARRIVALS.

No. 4 Wheeling & Cleve'd Exp	7 15 P.M
No. 2 Uhrichsville Accom	10 30 A.M

DEPARTURES.

No. 1 Wheeling & Cleve'd Exp	7 10 A.M
No. 3 Uhrichsville Accom	4 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS.

No. 7 Mahoning Valley Accommo	10 55 A.M
No. 3 New York Express,	*7 00 P.M
No. 1 New York Express,	6 50 A.M
No. 3 Pittsburgh Express,	*7 00 P.M
No. 5 Pittsburgh Express,	2 00
New York Express	2 00
No. 9 Youngstown and Pitts. Local	10 15

DEPARTURES.

No. 12 New York Express,	*7 10 A.M
No. 4 Youngstown Local,	11 00
No. 8 Mahoning Accommodation,	4 25 P.M
No. 2 New York Express,	10 45
No. 12 Pittsburgh Express,	*7 10 A.M
No. 6 Pittsburgh & Main Line Express	2 30 P.M

Cleveland & Pittsburgh.

	ARRIVE.	DEPART
Mail	1 45 P.M	8 50 A.M
Express	6 55	2 30 P.M
Alliance Accommodation	10 15 A.M	3 45
Ravenna Accommodation	8 35	5 30
Night Express	6 30 A.M	†11 40 P.M

† Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

ARRIVE.		DEPARTURES.	
No. 2 Accom.	10 15 A.M	No. 1 Mail	8 15 A.M
No. 6 Express	1 35 P.M	No. 3 Accom.	2 20 P.M
No. 4 Mail	6 30 P.M	No. 5 Exp.	6 05

Special trains leave on Sunday at 8.30 A. M. and 4.20 P. M., arriving at Cleveland at 10 A. M. and 6.25 P. M.

Trains leave from Depot foot of South Water Street.

Connotton Valley Railway.

Arrive.		Depart.	
No. 1	10 05 A.M	No. 4	4 05 P.M
No. 3	7 15 P.M	No. 2	0 15 A.M

All trains arrive and leave depot corner Commercial and Fifth Streets

Cleveland, Akron & Columbus Railroad,

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Railroad to Hudson, for Akron, Columbus, etc.

	ARRIVE.	DEPART.
Mail	1 15 P.M	8 00 A.M
Express	7 25	1 50 P.M
Accommodation	10 10 A.M	3 45 P.M

Geo. Oliver,

Manufacturer of the

IMPROVED UNITED STATES

BRAN DUSTER,

Mill street corner Brown

Rochester, N.

Bran Dusters Brushes and Wire Cloth furnished to order at Lowest Prices.

EDWARDS, TOWNSEND & CO.

WHOLESALE GROCERS,

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Wines, Liquors and Cigars,

Teas a Specialty.

Nos. 151 & 153 WATER STREET

CLEVELAND, O.

Lehman, Richman & Co.

IMPORTERS

AND JOBBERS OF

WOOLENS

And Manufacturers of

Men's, Youths', Boys' and Children's

CLOTHING!

86 & 88 WATER STREET, CLEVELAND, O.

invite the attention of close and short time buyers to the LARGEST STOCK between New York and Chicago, at prices guaranteed AS LOW as made by ANY responsible house in the United States.

Greatest Rock Breaker

ON EARTH.

CAPACITY { A TON A MINUTE. Don't Forget It!

Guaranteed to do Double the Work of any other or Money Refunded.

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52 Canal-St., Chicago. IRON WORKS.

IRON ROOFING.

MOSER & THOMPSON,

MANUFACTURERS

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Iron Ore Paints.

29, 31 & 33 River Street,

CLEVELAND, OHIO.

Send for Circular and Price List, mentioning this paper.

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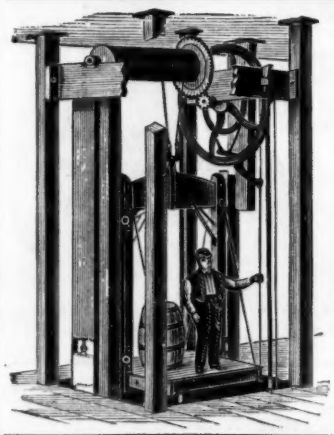

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OTTO SILENT GAS ENGINE,

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TRUCK HUBS.

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OLEAN, Cattaragus Co., N. Y.

Cleveland Foundry.

CASTINGS

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Car Wheels

all sizes and kinds, with and without Axles.

Chilled Faced R. R. Frogs.

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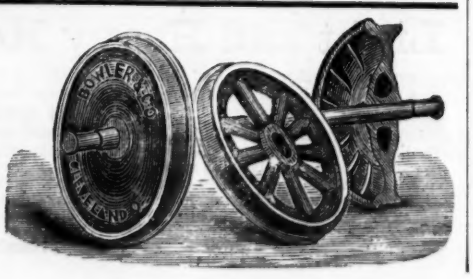
BOWLER & CO.



Blue Grass Route of Ohio

TIME TABLE.

The Cleveland, Mt. Vernon and Delaware RAILROAD.

GEO. D. WALKER, RECEIVER.

Schedule No. 5--Dating from Sunday, June 4.

SOUTH-BOUND TRAINS.

STATIONS.	Accom	Accom	Expr	Mail	Sunday only
Leave.	P. M.	P. M.	P. M.	A.M.	P.M.
Cleveland	5.30	3.45	2.30	8.50	....
Hudson	6 53	5.02	3.35	10.10	4 20
Cuyahoga Falls	7.11	5.30	3.58	10.29	4 40
Akron	7.23	5.46	4.10	10.42	5 00
*North Portage	P.M.	6.00	4 24	10.54*	6 14
Clinton	.....	6 19	4.44	11.09	5 31
Warwick	.....	6 29	4.49	11.14	5 37
*Marshallville	.....	6 43	5.02	11.27*	5 50
Orrville	.....	6 58	5.14	11.42	6 03
*Apple Creek	.....	7.17	5 32	11.58*	6 22
Fredricksburg	.....	7.32	5.45	12.11	6 37
*Holmesville	Accom	7.43	5 55	12.21*	6 48
Millersburg	A. M.	7.55	6.08	12.34	7 00
		P.M.			A.M.
Millersburg	5.50	.....	6.08	12.34	7 00
*Killbuck	6.02	.....	6.20	12.47*	7 12
*Black Creek	6.13	.....	6 31	12.59*	7 25
Gann	6.33 b 6.53	.....	6.51 B 7.11 S	1.19	7 47
Danville	7.04	.....	7.20	1.29	7 59
Howard	7.18	.....	7.29	1.38	8 10
Gambier	7.22	.....	7.38	1.47	8 20
Mt. Vernon	7.35	.....	7.51	2.00	8 33
*Bangs	7.45	.....	8.01	2.1.*	8 45
*Mt. Liberty	7.53	.....	8.09	2.20*	8 54
Centerburg	8.05	.....	8.18	2.30	9 05
*Condit	8.19	.....	8.32	2.44*	9 19
*Sunbury	8.27	.....	8.40	2.53*	9 28
*Galena	8.32	.....	8.45	2 58*	9 34
Westerville	8.48	.....	9.00	3 15	9 50
Arrive at Columbus	9.15	.....	9.25	3.40	10 20
	A.M.	.....	P M.	P.M.	A.M.

NORTH-BOUND TRAINS.

STATIONS.	Expr	Mail	Accom	Accom	Sundays only
Arrive at	P M	P. M.	A. M.	A. M.	A.M.
Cleveland	1 45	6.55	10.15	8.20	....
Hudson	12.35	5.48	8.53	7.15	10.30
Cuyahoga Falls	12.16	5.30	8.33	6.58	10.11
Akron	12.03	5.17	8.20	6.45	9.50
*North Portage	11.46	5.00*	8.03	A. M.	9.34
Clinton	11.30	4.44	7.46	.....	9.18
Warwick	11.25	4.37	7.37	.....	9.12
*Marshallville	11.10	4.27*	7.23	.....	9.00
Orrville	10.57	4.14	*7.10 b 6.40 b	.....	8.47
*Apple Creek	10.40	3.56*	6.22	.....	8.27
Fredricksburg	10.26	3.43	6.08	.....	8.13
*Holmesville	10 16	3.33*	5.58	Accom	8.02
Millersburg	10.05	3.22	5.45		7.50
			A. M.	P. M.	P.M.
Millersburg	10 05	3.22	.....	8.35	7.25
*Killbuck	9.51	3.08*	.....	8.23	7.13
*Black Creek	9.39	2.57*	.....	8.11	7.00
Gann	9.17	2.36	.....	7.49	6 38
Danville	9.07	2.27	.....	7.39	6.25
Howard	8.58	2.18	.....	7.29	6.14
Gambier	8.49	2.09	.....	7.14	6 03
Mt. Vernon	8.37	1.57	.....	7.02	5.51
*Bangs	8.22	1.40*	.....	6.46*	5.37
*Mt. Liberty	8.14	1.31*	.....	6.37	5.28
Centerburg	8.05	1.22	.....	6.28	5.17
*Condit	7.51	1.09*	.....	6.14	5.03
*Sunbury	7.42	1.01*	.....	6.06	4.53
*Galena	7.37	12 56*	.....	6.00	4.47
Westerville	7.20	12.40	.....	5.43	4.30
Leave Columbus	6.55	12.15	.....	5.15	4.00
	A. M.	P.M		P. M.	P.M.

* Stop on signal. B Breakfast. S Supper.

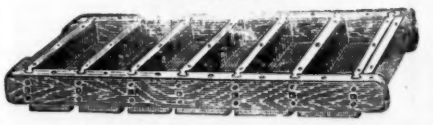
Special Round trip rates will be made for Sunday trains.

N. MONSARRAT, Gen'l Supt. Akron, O

E. T. AFFLECK, General Passenger Ag't, Columbus, O.

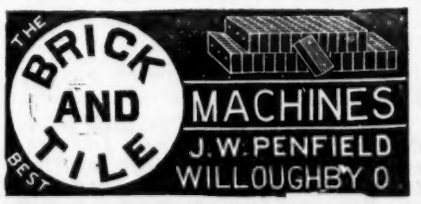
D. J. C. ARNOLD,

Manufacturer of



Brick Moulds, Off-bearing Trucks, Brick Wheelbarrows, &c.

All goods first class. Orders and correspondence solicited. NEW LONDON, O.



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Until further notice trains will leave the new Central Depot, South Water Street and Viaduct, as follows:

7:10A.M. LIGHTNING EXPRESS, (daily,) sleeping and hotel coaches from Leavittsburg. 8:55 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m., (dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p.m.; Buffalo, 6:15 p.m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p.m., (supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m.; Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

10:45 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsburg to New York without change. Arrives at Youngstown 1:45 a.m.; Meadville, 3:50 a.m.; Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a.m.; Rochester, 1:10 p.m.; Hornellsville, 11:20 a.m.; Corning, 12:53 p.m.; Elmira, 1:21 p.m.; Binghampton, 2:50 p.m.; New York, 9:25 p.m.

2:30 P.M. PITTSBURGH EXPRESS,— daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 7:48 p.m.; Washington, 7:30 a.m.; Baltimore, 8:15 a.m; via Sharon and Sharpsville to Meadville 7:40 p.m.; Corry, 9:10 p.m.; Lakewood, 9:50 p.m.; Jamestown, 10:00 p.m.; Salamanca, 11:10 p.m.

4:25 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:25 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p.m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 10:48 p.m.

7:10 A.M. PITTSBURGH EXPRESS,— (daily) through without change. Arrives at Youngstown, 9:50 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a.m.; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:33 a.m., and 1:13 p.m. and 4:20 p.m.

11:00 A.M. YOUNGSTOWN & PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 1:50 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:50 a.m., 10:55 a.m. 2:00, p.m. 7:00 p.m., and 10:15 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

Baggage Checked Through to All Points East

☞ Through Tickets and information regarding the route can be obtained at the Union Ticket Office, corner Bank and Superior streets; at office 131 Bank street, and at new Depot of New York, Pennsylvania and Ohio Railway, South Water street and Viaduct, Cleveland.

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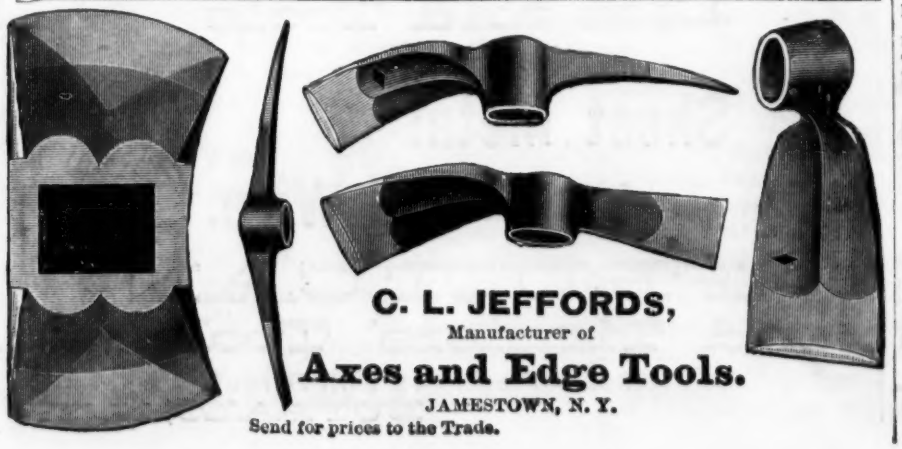

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Manufacturer of

Axes and Edge Tools.

JAMESTOWN, N. Y.

Send for prices to the Trade.

CLEVELAND & PITTSBURGH RAILROAD.

Condensed Time Table of Passenger Trains, corrected to June 4, 1882.

MAIN LINE—GOING WEST.

	Day Expr'ss.	Mail Expr'ss.	Fast Line.	Accom
Leave Pittsburgh..	8 00 a.m.	1 20 pm	11 50 pm	4 05 pm
Allegheny...	8 12	1 30	12 00 am	4 15
Arrive Rochester ...	8 53	2 20	12 50	5 00
Beaver	8 59	2 26	12 55	5 06
E. Liverpool.	9 37	2 59	1 37	5 46
Wellsville...	9 48	3 10	1 50	5 58 am
Salineville ..	10 27	3 49	2 33	Arrive.
Bayard.....	11 05	4 22	3 21	.....
Alliance.....	11 35	4 50	3 55 am	.....
Leave Alliance	11 40	4 55	4 05	7 40 am
Arrive Ravenna	12 18	5 29	4 47	8 20
Hudson	12 43 p.m.	5 53	5 15	8 50
Cleveland...	1 45 p.m.	6 55 pm	6 30 am	10 15 am

Accommodation train leaves Ravenna at 6.50 a. m., arrives Hudson 7.20 a.m., Cleveland 8.35 a.m.

☞ Fast Line and Western Express run Thro' Sleeping Car, Pittsburgh to Cleveland.

NOTE.—Fast Line leaves Pittsburgh Sunday nights, but not on Saturday nights.

MAIN LINE—GOING EAST.

	Pittsb'g Expr'ss.	Fast Line.	Day Expr'ss.	Accom.
Leave Cleveland...	8 50 am	2 30 pm	11 40 pm	3 45 pm
Arrive Hudson.....	10 00	3 28	12 50 am	4 50
Ravenna	10 40	3 53	1 18	5 24
Alliance.....	11 25	4 25	2 05	6 05 pm
Bayard.....	12 02 pm	4 47	2 49	.....
Salineville ..	12 44	5 22	3 40	Leave.
Wellsville...	1 20	5 50	4 35	8 05 am
E. Liverpool.	1 49	6 15	4 57	8 15
Beaver	2 26	6 47	5 47	8 59
Rochester ...	2 35	6 52	5 52	9 05
Allegheny ..	3 20	7 35	6 45 am	10 20
Pittsburgh..	3 30	7 45	6 55	10 30 am
Harrisburg.	.....	4 15 am	4 00 pm	.....
Baltimore...	.....	7 45	7 20	.....
Washington.	.....	9 15	8 47	.....
Philadelphia	.....	7 50	7 35	.....
New York...	.....	11 15	10 35	.....
Boston,.....	.....	8 00 pm	.....	.....

Accommodation train leaves Cleveland Union Depot at 5.30 p.m., arrives Hudson 6.48 p.m., Ravenna 7.15 p.m.

All trains connect at Yellow Creek for Wheeling and Bellaire.

☞ Fast Line runs Through Sleeper to New York. Day Express runs Through Sleeper to Pittsburgh.

All trains daily except Sunday.

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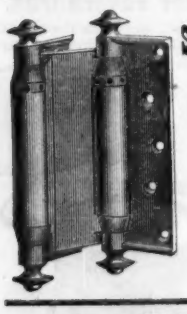
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SPIRAL SPRING HINGE,
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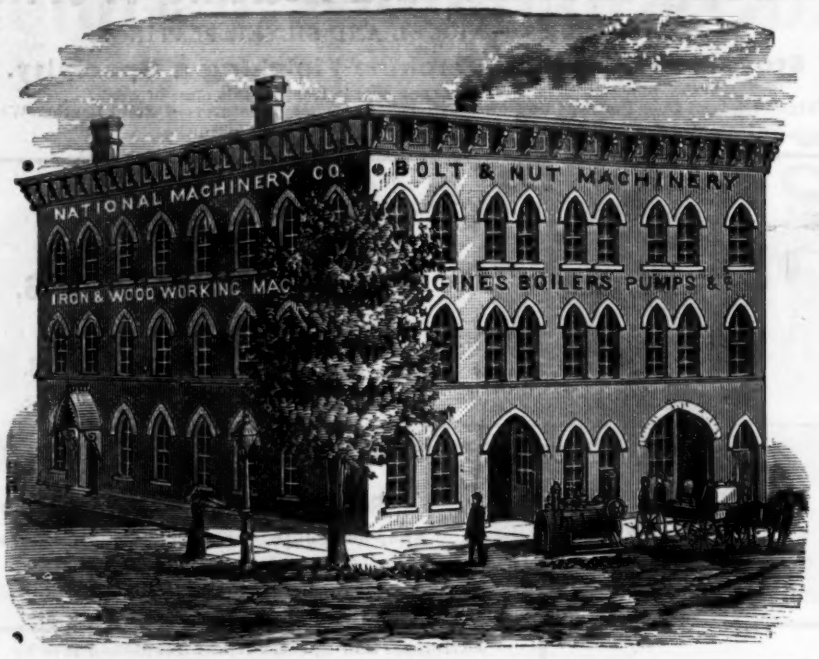
New Descriptive Circuiar on application.

NATIONAL MACHINERY COMP'NY.



Cor. Bond & Rockwell Streets, Cleveland, O.
SALESROOM—384 SUPERIOR STREET, CORNER BOND.
Manufacturers of
"National" Bolt and Nut Machinery,
Agents and Stock kept of Pratt & Whitney's Screw Cutting Tools, Taps, Dies, &c. Agents for J. A. White's, Levi Houston's and J. S. Graham & Co.'s Wood Working Machinery.
STOCK KEPT OF IRON AND WOOD WORKING MACHINERY,
Boilers & Engines.

In Stock for Sale:
One 4-horse power Engine and Boiler.
One 6-horse power Engine and Boiler
One 7-horse power Engine and Boiler.
One 10-horse power Engine and Boiler.
One 5-horse power Engine.
One 8-horse power Engine.
One 12-horse power Engine.
One 25-horse power Engine. New.
One 30-horse power Engine. New.
One portable Engine and Boiler 7½x10, mounted on wheels. All in complete order. Used only about three years.
One 30-inch under run French burr mill. All complete. Send for description and price.
One 35-horse power Engine. And several others all in stock.
New and Second Hand Belting, Pulleys, 2 Water Motors, &c., &c.

List of Wood Tools.
One second hand 18 inch Planer.
One " " 24 inch Planer.
One second-hand Dimension Planer, 24-inches, with Feed attachment.
One " " wood frame swing Cut-off Saw and Table.
One " " Slotting machine.
Two " " Saw Tables.
Large lot second-hand Trenton Vises.
Large lot second-hand Anvils.
One Fay & Co. Agricultural Morticer, with boring attachment.
One Fay & Co. iron frame Tenoning machine, double heads.
One second hand wood frame 2-spindle Shaper, $35
One " " " " Cutting-off Saw, $30
One " " " " Spoke and Handle Lathe $125
One " " 22 inch Greenwood Heading Planer, $125
One " " Ellis Blind Slat Tenoner.
One " " 24-inch Ball & Co., Planer and Matcher.
Two " " Sandpaper Drums.
Full line new wood framed Saw Tables.
Fine line of the celebrated Concord Band Saws, Jointers, Planers and Saw Benches.

Having moved our Salesroom to the large room previously occupied by the Wilson Sewing Machine Company, we are able to carry a very fine line of Wood Working Machinery and other Tools.

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CLEVELAND WINDOW GLASS CO.
For Doors, Sash, Blinds and Windows,
American, French & Plate Glass
73 Michigan Street and 132 Champlain Street,
Cleveland, Ohio.

NIAGARA STAMPING AND TOOL CO.,
Manufacturers of
Power and Foot Presses,
Dies and Tools
FOR WORKING
Sheet Metal and Wire.

FRUIT CAN
And Tinners' Tools, &c.
Nos. 147 and 149 Elm Street,
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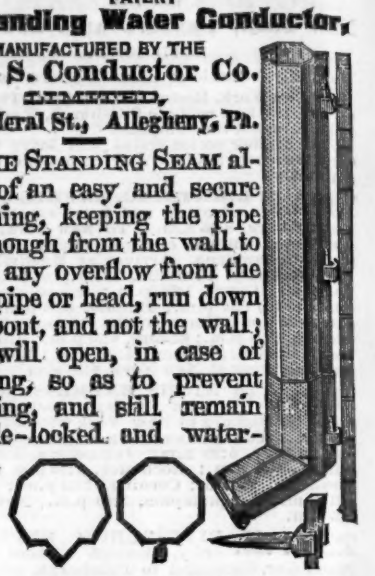
PATENT
Expanding Water Conductor,
MANUFACTURED BY THE
S. S. S. Conductor Co.
LIMITED,
47 Federal St., Allegheny, Pa.
THE STANDING SEAM allows of an easy and secure fastening, keeping the pipe far enough from the wall to make any overflow from the eave pipe or head, run down the spout, and not the wall; and will open, in case of freezing, so as to prevent bursting, and still remain double-locked and water-tight.

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E. B. Badger & Son, Boston, Mass.; Noyes & Wines, New York; J. S. Thorn, Philadelphia; John G. Hetzell, Baltimore, Md.; R. P. Gormully, Chicago; F. Schmidt & Sons, Milwaukee; Shackelton Bros., Cleveland; Patterson & Hayes, Erie, Pa.; G. H. Peters & Son, Buffalo, N. N.; James Ackroyd, Albany, N. Y.; Witt & Brown, Cincinnati,; Hull & Cozzens' Mnfg Co., St. Louis, Mo., and many others.

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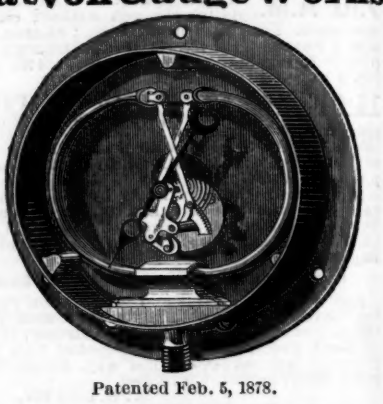
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ALSO, BAYLEY'S
IMPROVED DUPLEX GAUGE,
Specially adapted for Locomotives.
32 North Jefferson Street,
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All kinds of Gauges repaired at short notice.

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Twenty-nine Hundred Seventy-seven
2977 MACHINES 2977
NEW & SECOND-HAND
comprising
Machine and Blacksmith Tools of every description.
Woodworking Machinery in all its Branches, Portable Engines, Upright and Horizontal Stationary Engines. 1 to 300 horse power, Locomotive Fire-box, Upright Boilers, 1 to 100 horse power, Waterwheels, Cotton and Woolen Machinery, Steam Pumps, Grist Mill Machinery, &c., &c., &c.
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